CARLSON ENVIRONMENTAL, INC.

SITE INVESTIGATION REPORT

Fansteel, Inc.
Number One Tantalum Place
North Chicago, Illinois

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VOLUME ONE OF TWO

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LIST OF ACRONYMS/ABBREVIATIONS

CAB - cellulose acetate butyrate

CEI - Carlson Environmental, Inc.

Creek - Pettibone Creek

E&E - Ecology and Environment, Inc.

EE/CA - Engineering Evaluation/Cost Analysis

EPA - United States Environmental Protection Agency

Fansteel - Fansteel, Inc.

ft bgs - feet below ground surface

GLA QAP - Great Lakes Analytical Quality Assurance Program

HCl - hydrochloric acid

HNO_3 - nitric acid

HWMU - Hazardous Waste Management Unit

IEPA - Illinois Environmental Protection Agency

PCBs - polychlorinated biphenyls

PID - photoionization detector

PNAs - polynuclear aromatic hydrocarbons

ppm - parts per million

QAPP - Quality Assurance Project Plan

RCRA - Resource Conservation Recovery Act

Report - Site Investigation Report

SHSP - Site Health and Safety Plan

SIWP - Site Investigation Work Plan

SOPs - Standard Operating Procedures

SPLP - Synthetic Precipitate Leaching Procedures

TACO - "Tiered Approach to Corrective Action Objectives" (35 Ill. Adm. Code 742)

TAL - Target Analyte List

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LIST OF ACRONYMS/ABBREVIATIONS (Continued)

TCE - Trichloroethene

TCLP - Toxicity Characteristic Leaching Procedures

VLS - Vulcan Louisville Smelting Company

VOCs - volatile organic compounds

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1.0 EXECUTIVE SUMMARY

On behalf of Fansteel, Inc. (Fansteel), Carlson Environmental, Inc. (CEI) conducted a Site Investigation at the Fansteel facility in North Chicago, Illinois. The Site Investigation was conducted at the request of the United States Environmental Protection Agency (EPA), in accordance with the EPA-approved *Site Investigation Work Plan.* During the Site Investigation, CEI emplaced and sampled 37 soil borings and nine ground water monitoring wells. In addition, CEI collected samples from Pettibone Creek at three locations south of 22nd Street. This *Site Investigation Report* details the field activities and results of the Site Investigation. The laboratory results from the Site Investigation were compared to the action levels established in the *Site Investigation Work Plan.* Generally, the action levels represent conservative remediation objectives established by the Illinois Pollution Control Board in its "Tiered Approach to Corrective Action Objectives" or "TACO," as set forth in 35 IAC 742.

The Site Investigation was conducted to identify potential contaminants plumes which may be contributing to the contamination previously identified at the Vacant Lot Site. The Vacant Lot Site is located adjacent to and west of the Fansteel facility. Pettibone Creek transects the Vacant Lot Site in a north-south direction. Previous sampling events indicated the presence of heavy metals, trichloroethene (TCE), polychlorinated biphenyls (PCBs) and polynuclear aromatic hydrocarbons (PNAs) at the Vacant Lot Site and/or in Pettibone Creek.

With respect to the Fansteel property, the main concerns identified during the Site Investigation included two TCE soil and ground water plumes detected in the northern and southern portions of the property, and lead impacts to both soil and ground water. The northern TCE soil plume is in the vicinity of a former RCRA Hazardous Waste Management Unit (HWMU). Both TCE plumes appear to be migrating onto the Vacant Lot Site. CEI considers TCE and lead as "main" contaminants of concern since addressing these compounds will most likely dominant any remedial activity at the Fansteel property. Additional PNA and VOC compounds were identified in the soil and/or ground water at concentrations above the site action levels. Tantalum, a specialty metal historically used by Fansteel, was also detected in some soil samples. CEI notes that a standard risk-based action level for tantalum has not been established and that tantalum was not detected in any of the ground water samples

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analyzed by CEI during this Site Investigation. CEI recommends conducting a risk analysis, additional investigation and an *EE/CA* (Engineering Evaluation/Cost Analysis) to further evaluate the on-site and potential off-site impacts of all compound identified at concentrations above the site action levels.

With respect to Pettibone Creek, the Creek sediment results collected at three locations south of 22nd Street do not indicate the presence of significant contamination to the Creek sediments. The Creek sediment data is sporadic and does not indicate clear "trends." Some of the contaminants detected at the Fansteel property, such as TCE and lead, were also detected in sediment samples from Pettibone Creek. However, additional compounds, such as PNAs and PCBs, were detected in the Creek sediments at elevated concentrations that do not correlate with the concentrations at the Fansteel property. In addition, there are also several historic and operating industrial/commercial properties, other than Fansteel, located along Pettibone Creek. CEI therefore concludes that other sources separate from Fansteel appear to have contributed or may continue to contribute to the impacts detected in Pettibone Creek.

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2.0 INTRODUCTION AND BACKGROUND

2.1 Purpose of Site Investigation

On behalf of Fansteel, Inc. (Fansteel), Carlson Environmental, Inc. (CEI) has prepared this *Site Investigation Report (Report)*. This *Report* details the results of the recent Site Investigation conducted by CEI at the Fansteel North Chicago facility and additional sediment sampling in Pettibone Creek. The Site Investigation was performed in accordance with the *Site Investigation Work Plan* (*SIWP*) approved by United States Environmental Protection Agency (EPA) in its February 25, 2000, letter to CEI. As described in the *SIWP*, the Site Investigation involved the following activities:

- Conduct an investigation to identify any potential contaminant plumes which may be impacting the contamination detected at the Vacant Lot Site, and

- Collect additional samples from Pettibone Creek, which flows across the Vacant Lot Site in a north to south direction.

2.2 Project History

2.2.1 Vacant Lot Site Activities - Numerous site investigations have been conducted at the Vacant Lot Site which is located adjacent to and west of the Fansteel North Chicago facility. Pettibone Creek flows across the Vacant Lot Site in a north to south direction. In addition to previous investigations, Ecology and Environment, Inc. (E&E) conducted a site assessment at the Vacant Lot Site in 1994. The results of the previous investigations, which included the collection of soil samples and the collection of sediment samples from Pettibone Creek, indicated the presence of elevated concentrations of heavy metals, trichloroethene (TCE), and polychlorinated biphenyls (PCBs) on the Vacant Lot Site.

In 1997, E&E conducted an *Engineering Evaluation/Cost Analysis* (*EE/CA*) for the Vacant Lot Site under contract with EPA. The *EE/CA* included a historic review of the site, additional soil, ground water and sediment sampling at the Vacant Lot Site, a feasibility-type analysis of potential remediation alternatives, and a cost analysis for various remediation strategies.

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It is alleged in the *EE/CA* that historically, the Vacant Lot Site has been used for waste disposal, including the deposition of foundry sand and tailings, by industrial properties in the vicinity of the Vacant Lot Site. Additionally, the EPA believes that potential contamination at the Fansteel North Chicago facility may have impacted the ground water at the Vacant Lot Site. In addition to the Fansteel outfall just above Martin Luther King Junior Drive (i.e., 22nd Street), the other nearby facilities and city storm water discharge to Pettibone Creek. For example, the *EE/CA* for the Vacant Lot Site identified an inactive outfall at the origin of the Creek (at the north end of the Vacant Lot Site, where the North Chicago storm water discharge terminates under the elevated EJ&E railroad tracks). This inactive outfall is not attributed to Fansteel operations.

A property transfer of the Vacant Lot Site to EMCO Chemical (located west of the Vacant Lot Site) is pending. Based on information provided to CEI by EMCO Chemical representatives, it appears that EMCO Chemical's future development plans include building construction and a detention pond. To date, the sediments in the portion of Pettibone Creek that is located on the Vacant Lot Site have been removed and soil excavation has been conducted over much of the Vacant Lot Site, as recommended by the *EE/CA*. Due to the pending property transfer and proposed development plans, the excavated areas of the Vacant Lot Site have not yet been backfilled.

2.2.2 Fansteel Activities - Fansteel is currently undergoing RCRA Closure of a former Hazardous Waste Management Unit (HWMU) at the Fansteel North Chicago facility. The most recent investigative work associated with the RCRA Closure involved soil sampling conducted by CEI in 1990. During the RCRA-related investigations, elevated concentrations of TCE, lead and cadmium were detected in the site soils. The investigation results were submitted by Fansteel to the Illinois Environmental Protection Agency (IEPA) RCRA Section. Fansteel intends to work with the IEPA RCRA Section to complete the RCRA Closure of the HWMU.

In response to the EPA's request to conduct an investigation, Fansteel directed CEI to prepare a *SIWP*. This *SIWP*, along with a corresponding *Site Health and Safety Plan* and *Quality*

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Assurance Project Plan were submitted for EPA review and approval. Upon receiving approval of these documents, CEI commenced the Site Investigation field activities.

As indicated in the EPA-approved *SIWP*, the overall strategy for conducting the Site Investigation was based on site-wide soil sampling with perimeter ground water monitoring. The initial Site Investigation activities included emplacing 33 borings across the site to a depth of approximately 20 feet below ground surface (ft bgs). Nine of the borings were converted to ground water monitoring wells, each screened from approximately 10 to 20 ft bgs. Select soil and ground water samples were analyzed for potential contaminants of concern (refer to Section 4.5).

Since the portion of Pettibone Creek crossing the Vacant Lot Site has been remediated, CEI's investigation of Pettibone Creek focused on the portion of the Creek downstream (south) of the Vacant Lot Site. CEI collected sediment samples from Pettibone Creek at three locations approximately 300, 600 and 900 feet south of 22nd Street. At each location, samples were collected from two depths, 0 to 6 inches and 6 to 12 inches below the Creek bottom. The sediment samples were analyzed for potential contaminants of concern (refer to Section 4.6).

The elevated EJ&E railroad tracks run along the north border of the Vacant Lot Site and the Fansteel North Chicago facility. Immediately north of these tracks is a drainage ditch along the opposite side of the elevated railroad tracks which appears to flow in a westerly direction and drains into Pettibone Creek just north of the Vacant Lot Site. A fenced area containing a bank of ComEd transformers where staining was previously observed is located along this drainage ditch. During the Site Investigation, CEI collected two sediment samples from this drainage ditch, at depths of 0 to 6 inches and 6-12 inches below the drainage ditch bottom. The sediment samples were analyzed for potential contaminants of concern (refer to Section 4.6).

2.2.3 Previous Submittals Incorporated by Reference - In conjunction with the *SIWP*, CEI also prepared a *Site Health and Safety Plan* and a *Quality Assurance Project Plan*. These documents, along with a *Quality Assurance Program* prepared by Great Lakes Analytical were submitted for EPA review and approval. Within this *Report*, CEI references

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previous submittals to the EPA. These documents are listed below and incorporated by reference.

- E&E - *Engineering Evaluation/Cost Analysis for the Vacant Lot Site North Chicago, Illinois*, dated October 30, 1997 (*EE/CA*).
- CEI - *Site Investigation Work Plan*, Revised Version 2.1, dated July 1999 (*SIWP*).
- CEI - *Site Health and Safety Plan*, Revised Version 2.0, dated October 1998 (*SHSP*).
- CEI - *Quality Assurance Project Plan*, Revised Version 1.2, dated July 1999 (*QAPP*).
- Great Lakes Analytical (GLA) - *Great Lakes Analytical Quality Assurance Program*, Revision 5.7, dated February 18, 1998, with addendums (*GLA QAP*).

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3.0 GENERAL SITE INFORMATION

3.1 Site Description

The Fansteel North Chicago facility is located at Number One Tantalum Place, approximately two miles east of the intersection of Martin Luther King Jr. Street and U.S. Highway 41, in North Chicago, Lake County, Illinois (refer to Figure One in Attachment A). The site is bounded by the North Chicago Refiners and Smelters facility to the east, Martin Luther King Jr. Street and the Federal Chicago plant to the south, the Vacant Lot Site to the west, and the elevated Elgin, Joliet & Eastern (EJ&E) tracks to the north.

The site consists of an older plant complex located on an approximately eight-acre parcel. There are two brick buildings on the site; the boiler house and the main production building which is comprised of multi-story and multi-use inner buildings. In addition, a transite building and a few aluminum buildings are present on the site. Total gross floor space is reportedly 325,500 square feet.

The portions of the property not covered by buildings are generally asphalt- or concrete-paved and are used as parking lot areas or access ways. Two large, empty and cleaned upright above-ground tanks are located at the northern end of the property. A railroad spur is located just inside the eastern edge of the site, and an elevated railroad siding is located just south of the above-ground tanks. The entire site is enclosed by security fencing, and there is some vegetation, consisting of grass and bushes, between the office area and Martin Luther King Jr. Street.

The site topography is essentially flat, although on the east side, the site is elevated near the fence line, sloping down into the parking lot. The building is elevated compared to the parking lot, and the railroad spur on the east side is several feet below the site grade. The railroad property north of the site slopes steeply downwards toward the site. The site configuration is depicted in Figure Two in Attachment A.

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3.2 Site Physiography

In November 1993, Geraghty & Miller, Inc. conducted a ground water investigation at the Vacant Lot Site, which focused on shallow ground water to a depth of 14 ft bgs. The investigation was detailed in a report, *Groundwater Investigation, Stack Property, North Chicago, Illinois* dated June 1994. The information below regarding the site geology and site soils is summarized from this report prepared by Geraghty & Miller, Inc.

3.2.1 Site Geology - The general regional geological information indicates that unconsolidated deposits in the vicinity of the site consist of glacial lake deposits and glacial till. The deposits consist of silt, clay and sand deposits accumulated on the floors of glacial lakes. These strata are reportedly underlain by glacial till. Generally, the glacial lake deposits range from 10 to 25 feet in thickness with the underlying glacial till ranging from 50 to 100 feet in thickness.

3.2.2 Site Soils -Based on the borings advanced by Geraghty & Miller, Inc. during its investigation, the soil at the Vacant Lot Site generally consisted of 1.5 to 5 feet of black sandy fill resembling slag or fly ash. Tan to gray silty clay containing discontinuous lateral silty to gravel/ sand deposits is located beneath this fill material to a depth of approximately 10 ft bgs. Grayish silty clay with several discontinuous lateral thin sand and gravel seams are present from approximately 10 to 20 ft bgs. As discussed in Section 6.2, the soils generally encountered by CEI during the Site Investigation were similar to those encountered by Geraghty & Miller, Inc. on the Vacant Lot Site.

3.2.3 Pettibone Creek - As discussed in the *EE/CA* prepared for the Vacant Lot Site by E&E:

> "The [Vacant Lot] site is transected by the Pettibone Creek (Creek), an intermittent water body that lies in a relatively steep-sided ravine, and originates at the northwest boundary of the [Vacant Lot] site. The ravine is lined with large weeds, bushes, and deciduous trees. The Creek flows through the [Vacant Lot] site from north to south, and then flows east into Lake Michigan (1.5 miles from the site). The Creek, at its origin receives water through the North Chicago storm water discharge and a ditch.

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The Creek is also fed by rainwater and outfalls from two nearby industries/facilities, EMCO Chemical Distributing, Inc. (EMCO), and Fansteel, Inc. (Fansteel)."

As discussed in Section 2.2.1, the Pettibone Creek sediments have been excavated from the Vacant Lot Site. CEI's sampling focused on the portions of Pettibone Creek south of 22nd Street. CEI notes that outfalls from several other facilities also discharge into Pettibone Creek, including an inactive outfall that was located at the origin of the Creek.

3.3 Site History

Vulcan Louisville Smelting Company (VLS) previously operated on the areas that currently comprise the Vacant Lot Site, the Fansteel North Chicago facility and North Chicago Refiners and Smelters. Based on a review of Sanborn Fire Insurance Maps, VLS is shown to occupy areas of the Fansteel North Chicago facility during 1912, 1917, 1924 and 1929. Prior to VLS, previous site owners of Lanyon Zinc Oxide Smelting Company and the Mineral Point Zinc Company operated on the areas that currently occupied the Vacant Lot Site, the Fansteel North Chicago facility and North Chicago Refiners and Smelters.

In 1942, the federal government, through its Defense Plant Corporation, purchased a portion of the VLS property and authorized and financed, the construction of Fansteel's North Chicago facility. A Fansteel subsidiary, the Tantalum Defense Corporation, was formed and leased the site from the federal government. Tantalum Defense Corporation operated the facility under direction of the federal government in order to supply the government with strategic materials needed during World War II. The federal government owned the facility from 1942 to 1947. In 1947, the facility was sold by the federal government to Fansteel, but the federal government retained a significant interest in the property until 1954. The Fansteel Metals Division and Fansteel VR/Wesson Foundry Division previously operated at the site. The main facility operations included the production of specialty metals and related products, in addition to foundry operations. Production activities at the North Chicago facility ceased in 1990.

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3.4 Current Site Operations

The site is currently used by Fansteel as office space for its corporate headquarters. Production related activities ceased at the North Chicago facility in 1990. The former plant buildings are primarily vacant and are routinely maintained, as necessary.

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4.0 FOCUS OF SITE INVESTIGATION

4.1 Soil

During the Site Investigation, a total of 37 soil borings were emplaced at locations across the Fansteel North Chicago facility to a depth of approximately 20 ft bgs (refer to Figure Two in Attachment A). The boring locations were based on a grid system that is detailed in Section 4.2.1 of the *SIWP*. The borings were continuously sampled and the samples were placed in appropriate laboratory sample containers for possible laboratory analysis.

4.2 Ground Water

During the Site Investigation, CEI installed a total of nine ground water monitoring wells. Each well was screened from approximately 10 to 20 ft bgs (refer to Figure Two in Attachment A). Various utility lines introduced physical constraints which led CEI to place two of the nine ground water monitoring well on the eastern portion of the Vacant Lot Site rather than on the Fansteel property. As discussed in Section 4.2.2. of the *SIWP*, the well placements were designed to provide perimeter monitoring of the Fansteel property, with an emphasis placed on the west property line which separates the Fansteel property from the Vacant Lot Site.

4.3 Pettibone Creek Sediment

As discussed in Section 2.2.1, the Creek sediments have been excavated from the Vacant Lot Site. Therefore, CEI's investigation focused on the portion of Pettibone Creek located south of 22nd Street. CEI collected sediment samples from two sample depths (0 to 6 inches and 6 to 12 inches) at three locations south of 22nd Street (refer to Figure Three in Attachment A).

4.4 Ditch Sediment

CEI collected sediment samples from a drainage ditch that is located north of the elevated EJ&E tracks and drains into Pettibone Creek. This drainage ditch appears to receive surface runoff from an adjacent transformer bank where staining was previously observed by CEI.

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4.5 Compounds of Concern in Soil and Ground Water

As described in Section 3.5 of the *SIWP*, elevated concentrations of volatile organic compounds (VOCs), lead and PNAs have been detected at the Vacant Lot Site. In addition, elevated concentrations of VOCs, lead and cadmium have been detected during the previous RCRA-related investigations at the Fansteel property. Therefore, the Site Investigation analyses for potential contaminants of concern in the soil and ground water included VOCs, PNAs, lead and cadmium.

At the request of the EPA, tantalum, a specialty metal previously used by Fansteel, was added to the list of analytes for the soil and ground water analyses.

4.6 Compounds of Concern in Creek and Ditch Sediments

Based on the results of the *EE/CA* and at the request of the EPA, VOCs, PNAs, the 23 Target Analyte List (TAL) Metals, tantalum, PCBs, pesticides and cyanide were regarded as potential contaminants of concern for the Creek sediment samples collected by CEI during the Site Investigation. With the exception of pesticides, CEI also analyzed the ditch sediment samples for these compounds.

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5.0 SITE INVESTIGATION FIELD ACTIVITIES

The field activities proposed by CEI in the *SIWP* were performed between April and September of 2000. The Site Investigation included the emplacement and sampling of soil borings, and the installation, development, and sampling of ground water monitoring wells in addition to sediment sampling from Pettibone Creek and the drainage ditch located north of the Vacant Lot Site. Four additional soil borings (37 borings total) were added to Site Investigation scope of work. All field investigation activities were conducted in accordance with the *SIWP*, *SHSP*, CEI's *QAPP* and CEI's SOPs. George Varela of CEI was present during each of the field activities. Additional field assistance was provided by CEI staff members Margaret Karolyi, Steve Allen, Kristin O'Brien, Paul Micari and Mark Castro.

5.1 Preliminary Activities

Prior to beginning the field activities associated with the Site Investigation, CEI arranged for a site meeting between CEI, Fansteel representatives and the various local underground utility locating services to identify any natural gas, electric, water, sewer, cable television, or telephone utilities that may be located at the site. CEI also coordinated with the location of the two wells installed on the Vacant Lot Site with representatives of EMCO Chemical.

All personnel involved in this project have received the appropriate hazardous waste site worker training (29 CFR 1910.120). In addition, all personnel were trained in general and site-specific health and safety procedures, as well as quality assurance and quality control procedures. At the start of each field day, a safety meeting was attended by CEI and the representatives of Enviro-Dynamics, LLC (when on site) and a task-specific hazard analysis was conducted to address each day's field activities.

5.2 Sampling Locations

The soil boring and ground water monitoring well locations are shown in Figure Two in Attachment A. The sediment sample locations are shown in Figure Three in Attachment A. The ditch samples are not shown on a figure but were collected at a location in the ditch immediately north of the railroad track embankment. The rationale for placement of the sample locations is described in Section 4.2 of the *SIWP*. In an effort to define the extent of

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soil contamination, CEI emplaced four additional soil borings (GP-34 through GP-37) in the western portion of the Fansteel property.

5.3 Soil Sampling Procedures

Thirty-seven soil borings were emplaced at the subject site on April 17 - April 20, 2000 and on May 25, 2000. The borings were emplaced by Enviro-Dynamics, LLC, a GeoProbe subcontractor from Hobart, Indiana. During the boring activities, CEI staff members conducted soil logging and sampling activities. The borings were emplaced and sampled using Model 54DT track-mounted GeoProbe® Macro Core Soil Sampling System. CEI notes this is a different model GeoProbe than that proposed in the *SIWP*.

Each soil boring was advanced to a depth of approximately 20 ft bgs. Soil samples were collected from each boring using a 48-inch stainless steel sampling tube lined with cellulose acetate butyrate (CAB) sampling sleeves. The borings were continuously sampled and the soil retrieved from the four-foot GeoProbe interval was generally be divided into two samples, each corresponding to a two-foot sample interval. In all soil borings not emplaced through building foundations, CEI separated the first GeoProbe interval into three sample intervals: 0-1 feet; 1-2 feet and 2-4 feet.

Samples from any one boring were assigned alphanumeric identification numbers based on the boring number, followed by the depth of the sample collected. The shallowest sample will be given the letter "A," the next "B," etc. (e.g., GP-2A, GP-2B). Any duplicate samples will be followed by the suffix -DUP (i.e., GP-2A-DUP). The geological material associated with each sample was visually classified and noted on boring logs, included as Attachment C.

Upon completion of the boring, any excess cuttings were containerized and the boreholes were filled with bentonite chips. Cement was used to bring any borings emplaced through asphalt or concrete paving back to grade.

All soil samples were examined for visual evidence of contamination and field screened using a photoionization detector (PID). The PID is an effective device for identifying areas where

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VOCs and PNAs (e.g., oils, solvents, gasoline constituents) may exist. However, it does not identify specific compounds or their concentrations.

Soil samples reserved for VOCs analysis were field preserved in accordance with EPA Method 5035 and CEI's SOPs. As described in Section 4.3.1 of the *SIWP*, at each sample interval, soil was weighed and placed into pre-weighed laboratory-suppliedcontainers. As appropriate, stir bars and preservative were added to the sample containers. CEI notes, no indication of significant effervescence was observed during the sampling activities, therefore the preserved samples were submitted to the laboratory for VOCs analysis. Additional 4-ounce jars were packed with soil to minimize headspace. Sample analyses other than VOCs were performed by the laboratory on the soil from the 4-ounce jars.

The samples submitted for laboratory analysis were selected on the basis of lithology and visual observations (i.e., staining), PID screening, and sample depth. For VOCs, CEI generally submitted the sample interval exhibiting the highest PID reading for laboratory analysis. Samples from additional intervals were analyzed for VOCs as necessary to define the extent of soil contamination. Staining, visual appearance and lithology (i.e., slag and fill material) was primarily used to select the sample from each boring that was submitted for laboratory analysis of inorganic compounds.

5.4 Sediment Sampling Procedures

The sediment samples from Pettibone Creek and the ditch north of the Vacant Lot Site were collected by CEI on June 7, 2000. At each sediment sample location, the sediment samples were collected using a sediment sampler equipped with a plunger. The sediment samples collected for VOCs analysis were field preserved using EPA Method 5035; the remaining portion of the sample was placed in several 4-ounce jars. At each sample location, two sediment samples were retrieved from two sample depths, 0 to 6 inches and 6 to 12 inches below the Creek or ditch bottom.

All sampling equipment was cleaned with an alconox solution and rinsed with distilled water prior to use at each location. The individual collecting the samples wore new vinyl gloves during the collection of each sample.

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5.5 Ground Water Sampling Procedures

5.5.1 Monitoring Well Installation - Upon completion of the related borings, nine borings were converted to ground water monitoring wells. The wells were constructed on April 17 - April 18, 2000 and May 25, 2000. The wells were installed by Enviro-Dynamics, LLC by using the Model 54DT GeoProbe® hammer to drive 3.5-inch diameter well rods into previously completed boreholes. Each well was constructed using new stainless steel well screens and risers. Well screening and casing materials was steam-cleaned prior to installation. Quartz sand was be placed around the screen to an elevation of 1 foot above the screen. A bentonite seal was be placed above the quartz sand to provide an impermeable seal in the borehole. With the exception of monitoring wells MW-4 and MW-9, flush-mounted steel well boxes were cemented in place over each the each wells to secure the wells in place. Monitoring wells MW-4 and MW-9, which are located on the Vacant Lot Site, were protected using steel stick-up well protectors and bumper posts. Monitoring well construction diagrams are included in Attachment D.

5.5.2 Monitoring Well Development - On June 13, 2000, CEI developed each of the wells using surge/pump procedures and/or hand-bailing with a stainless steel bailer. Prior to development, the static water level of each well was measured and recorded. During development the temperature, pH and conductivity of the water in each well was measured and recorded. The amount of water removed from each well is included on the monitoring well construction diagrams in Attachment D.

On June 22, 2000, CEI returned to the site to measure the static water volumes in each of the developed wells. At this time, CEI installed tubing to accommodate low-flow sampling. The tubing was inserted to a bottom depth approximately equivalent to the midpoint of the height of the newly measured standing water column. The new, dedicated polyethylene tubing was secured in each well.

5.5.3 Determination of Ground Water Flow Direction - On September 15, 2000, CEI conducted a topographical survey of the well locations. Using the survey data to correlate the heights of the well casings with the previously measured static water elevations, CEI

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calculated the relative static ground water elevations at each of the well locations. From the relative static ground water elevations, CEI calculated the relative near-surface ground water flow direction to be generally southwest, as shown in Figure Four in Attachment A. CEI notes that influences, including the presence of utility lines and building foundations, may produce localized effects around each well. These localized effects may slightly skew the relative ground water elevations. As such, CEI has elected to present the apparent ground water flow direction as generally to the southwest, rather than detailing potentiometric lines corresponding to the measured static ground water elevations.

Specifically, CEI believes that monitoring wells MW-1 (inside the warehouse), MW-3, MW-7 and MW-8 are locally influenced by the building foundations. Due to nearby utilities, monitoring well MW-2 was placed in between the railroad tracks at an elevation approximately three feet lower than surrounding grade. This elevation difference and the presence of the nearby utilities may have produced a localized effect on MW-2. Monitoring wells MW-4 through MW-9 are most likely influenced by the presence of utility lines running along Fansteel's west property line, in addition to the elevation difference produced by the excavation activities at the Vacant Lot Site (which had not been backfilled at the time of CEI's sampling).

5.5.4 Low Flow Ground Water Sampling -Due to a pump malfunction, the ground water sampling was conducted over a period of two days, August 15 and August 17, 2000 rather than on a single day. Mr. Raghu Nagum of T&N Associates, as a contractor to the EPA, was present to observe the sampling activities. The wells were sampled following CEI's SOP for low-flow ground water sampling. A peristaltic pump was connected to the low-flow tubing previously installed in each well. Prior to sampling, pumping to purge each well was performed until the water visually appeared clear and the pH and conductivity appeared to have stabilized.

All sampling equipment was cleaned with an alconox solution and rinsed with distilled water prior to use at each well. The individual collecting the samples wore wear new vinyl gloves during the collection of each sample.

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The ground water samples were pumped directly into the appropriate sample containers. The sample containers and preservation methods are outlined in Table One in Attachment B of the *SIWP*. Ground water samples targeted for VOCs analysis were placed in a 40-mL vial preserved with hydrochloric acid (HCl), in accordance with EPA Method 5030. No headspace was permitted in the VOC samples. If bubbles were observed in the sealed 40-mL vial upon collection, the vial was discarded in a 55-gallon drum and a new sample vial was collected. Ground water samples targeted for metals analysis were placed in a 500-mL plastic bottle preserved with nitric acid (HNO_3). Three times the normal ground water sample volume was collected from monitoring wells MW-3 to provide the matrix spike and matrix spike duplicate samples for ground water.

5.6 QA/QC Procedures

In order to preserve the accuracy of the sample results from the Site Investigation, CEI employed the decontamination procedures for the sampling equipment listed below. These procedures are designed to prevent cross-contamination between samples collected during the Site Investigation. All decontamination fluids, used PPE, development/purge water and soil cuttings were placed in 55-gallon drums.

- A temporary decontamination area was constructed and used during the Site Investigation field activities. All steam-cleaning activities were conducted within this decontamination area and all decontamination fluids were contained and placed into a 55-gallon drum.

- All "down hole" equipment, including GeoProbe® rods and sampler assembly, well screening and well casing materials, was steam-cleaned prior to beginning each boring.

- New GeoProbe® CAB sampling sleeves were used for each sample interval.

- All samples collected for potential laboratory analysis were placed into new, laboratory-supplied sample containers.

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- The individual(s) handling the samples donned a new pair of vinyl (or other appropriate) gloves prior to handling and collecting each sample.

Additional QA/QC samples, including duplicates, field and trip blank samples, were collected and submitted for selected analyses, as discussed in the CEI *QAPP*. CEI collected duplicate samples at a ratio of at least one duplicate sample for every ten samples initially submitted for laboratory analysis. Field and trip blanks were collected each day field activities are conducted. Additionally, matrix spike samples were analyzed at a ratio of approximately one sample to every 20 soil samples initially submitted for laboratory analysis, and one ground water matrix spike sample/matrix spike duplicate sample. Copies of the analytical laboratory reports for the field and trip blanks are included in Attachment F.

5.7 Analytical Procedures

All samples were collected and placed in clean glass jars, vials or bottles with Teflon®-lined lids or septa supplied by the laboratory. The samples were maintained at a temperature of approximately 4° C in an insulated container. Upon completion of the site sampling, all samples were transported from the site by Great Lakes Analytical to its laboratory in Buffalo Grove, Illinois. All samples were maintained under standard chain-of-custody procedures. Table One in Attachment B of the *SIWP* provides a summary of the number of samples proposed for collection and the appropriate sample containers with the associated preservatives.

All soil, ground water and sediment samples were analyzed using the EPA's Test Methods of Evaluating Solid Wastes, Third Edition, (SW-486). The analytical methods and preservation requirements are listed on Table One in Attachment B of the *SIWP*.

The laboratory procedures, quality assurance and quality control measures associated with the analytical methods are detailed in the *GLA QAP*. Copies of the analytical laboratory reports are included in Attachment E. For ease of reference, CEI organized the laboratory reports in Attachment E first by type of analyses (i.e, VOCs, PNAs, etc.) and, secondly, by sample number. The laboratory reports related to the field and trip blank samples are included as

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Attachment F. GLA has compiled the data quality reports which will be maintained in CEI's office with the Fansteel project files.

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6.0 SITE INVESTIGATION RESULTS

6.1 Action Levels

The results of the Site Investigation are summarized in the tables included as Attachment B. The tables compare the analytical results to the action levels for the site. Generally, the results were compared to the Tier 1 remediation objectives for industrial/commercial properties with Class I ground water that are listed in the Illinois Pollution Control Board's *Tiered Approach to Corrective Action Objectives*, "TACO" (35 Ill. Adm. Code 742). TACO incorporates a risk-based approach to determining site-specific remediation objectives. The TACO Tier 1 remediation objectives represent the most stringent remediation objectives that would apply to a remediation site. Generally, TACO Tier 1 remediation objectives are established for the various potential exposure pathways (i.e. ingestion, inhalation). For compounds for which a Tier 1 remediation objective has not been established, the reporting limit for the compounds was applied as the action level.

The action levels included in the EPA-approved *SIWP* represent the most stringent of the Tier 1 remediation objectives for industrial/ commercial properties with Class I ground water for each compound. Within this *Report*, CEI compared the Site Investigation results to these action levels. Fansteel recommends that any contaminant detected at a concentration exceeding the action level be further evaluated in the *EE/CA* (refer to Section 7.9).

6.2 Field Observations

As shown on in the boring logs in Attachment C, the site soils generally consisted of fill material underlain by grayish silty clay. The soils composition, especially below depths of 8 feet, was similar across the majority of the site. The soil lithology encountered on during the Site Investigation is similar to the lithology encountered at the Vacant Lot Site. As indicated on some of the boring logs, some slag-type and fly-ash types of materials were encountered in some of the fill material (specifically in samples GP-17B, GP-18B, GP-29C and GP-30B). CEI conducted field screening with a PID. Elevated PID concentrations were detected in some of the borings. Samples from intervals with high PID readings were submitted for VOCs analysis.

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6.3 Soil Results

The soil sampling results are summarized in Tables One through Three in Attachment B. Specifically, Table One provides a summary of the VOC results for the soil samples collected during the Site Investigation. A total of 141 soil samples, including 28 surface samples (i.e., from 0-1 or 1-2 ft bgs) and 7 duplicate samples, were analyzed for VOCs. For the surface samples, several VOCs (cis-1,2-dichloroethene, methylene chloride, tetrachloroethene, TCE and vinyl chloride) were detected at concentrations above the migration to ground water exposure route objective and/or the above the ingestion or inhalation exposure route objectives. For the subsurface samples (i.e, deeper than 4 ft bgs), several VOCs (acetone, carbon disulfide, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene, methylene chloride, tetrachloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethene, TCE and vinyl chloride) were detected at concentrations above the migration to ground water exposure route objective and/or above the ingestion or inhalation exposure route objectives.

Table Two provides a summary of the PNA results for the soil samples collected during the Site Investigation. A total of 67 soil samples, including 26 surface samples and 4 duplicate samples, were analyzed for PNAs. For the surface samples, four PNA compounds (benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene and dibenzo(a,h)anthracene) were detected at concentrations above the objectives for the migration to ground water exposure route and/or the ingestion or inhalation exposure routes. For the subsurface samples, elevated PNA compounds were detected in only one sample, GP-17C at 2-4 ft bgs. CEI notes that PNAs were not detected in a deeper sample collected from this boring, GP-17E at 6-8 ft bgs.

Table Three provides a summary of the metals and pH results for the soil samples collected during the Site Investigation. A total of 85 soil samples, including 33 surface samples and 4 duplicate samples, were analyzed for one or more of the following analyses: tantalum, lead, cadmium, SPLP lead and pH. The tantalum concentrations ranged from no detection to 325 parts per million (ppm). CEI notes there is no standard risk-based action level established for tantalum. The total lead concentrations ranged from 5.5 ppm to 23,000 ppm and the SPLP concentrations ranged from no detection to 0.169 ppm. Several concentrations of total lead exceed the ingestion remediation objective of 400 ppm and several concentrations of SPLP lead exceed the migration to ground water remediation objective of 0.0075 ppm. CEI notes

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the concentrations of SPLP lead detected at the site are below 5 ppm, the hazardous by characteristic level for TCLP lead. The highest concentration of total cadmium detected during the Site Investigation was 38.4 ppm, which is below the TACO objectives for all the potential exposure routes. The pH levels detected in the analyzed samples ranged from 6.12 to 10.3 pH units.

The soil sampling results provide an identification of the contaminants of concern that were detected at the site at concentrations above the action levels. These contaminants of concern will be further evaluated during an *EE/CA* investigation (refer to Section 7.9).

6.4 Ground Water Results

The ground water sampling results are summarized in Tables Four and Five in Attachment B. A sample from each of the ground water monitoring wells was collected using low-flow sampling techniques and was analyzed for VOCs, tantalum, lead and cadmium. As shown in Table Four, several VOC compounds were detected in one or more of the samples from monitoring wells MW-2, MW-4, MW-8 and MW-9. No VOCs were detected in the ground water samples collected from monitoring wells MW-1, MW-3, MW-5, MW-6 and MW-7. The concentrations of three VOC compounds (cis-1,2-dichloroethene, trichloroethene and vinyl chloride) exceeded the corresponding ground water remediation objectives. The remaining VOCs were detected at concentrations below the ground water remediation objectives.

As shown in Table Five, tantalum was not detected in any of the ground water samples. Cadmium was detected at levels below the ground water remediation objectives in samples from monitoring wells MW-4 and MW-9; cadmium was not detected in the samples from the remaining ground water monitoring wells. Lead was not detected in three of the ground water monitoring well samples (MW-1, MW-3 and MW-7), but was detected at concentrations above the ground water remediation objective in the remaining six ground water samples.

6.5 Creek Sediment Results

The Creek sediment results are presented in Tables Six through Nine in Attachment B. As shown in these tables, tetrachloroethene, vinyl chloride, benzo (a) anthracene, benzo (a)

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pyrene, dibenzo (a,h) anthracene, arsenic, selenium and SPLP lead were detected in one or more of the samples at concentrations above the action levels. An elevated concentration of total lead above the remediation objective was detected in each sediment sample. CEI notes that although elevated methylene chloride concentrations were reported by the laboratory, methylene chloride was also detected in the laboratory blank. CEI therefore attributes the methylene chloride concentrations to laboratory artifacts rather than sediment contamination. Although the compound PCB-1260 was detected in some of the sediment samples, the detected concentrations were below the remediation objectives. No pesticides were detected in the sediment samples.

6.6 Ditch Sediment Results

The ditch sediment results are presented in Tables Six through Eight in Attachment B. Elevated concentrations of arsenic, lead, SPLP lead and methylene chloride were detected in the ditch sediment samples. Because methylene chloride was detected in the laboratory blank, CEI attributes the methylene chloride concentrations to laboratory artifacts rather than sediment contamination. No elevated PNAs or PCB compounds were detected in the sediment samples.

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7.0 ANALYSIS OF SITE INVESTIGATION RESULTS

With respect to the Fansteel property, the main contaminants of concerns identified during the Site Investigation included two TCE soil and ground water plumes detected in the northern and southern portions of the property, and lead impacts to both soil and ground water. CEI considers TCE and lead as "main" contaminants of concern since addressing these compounds will most likely dominant any remedial activity at the Fansteel property. Additional PNA and VOC compounds-were identified in the soil and/or ground water at concentrations above the site action levels. Tantalum, which does not have an established risk-based action level, was also detected in some of the soil samples. As discussed in Section 7.9, CEI recommends conducting a risk analysis and an *EE/CA* to further evaluate the on-site and off-site impacts of all compound identified at concentrations above the site action levels.

With respect to Pettibone Creek, some of the contaminants detected in the Creek, such as TCE, lead and tantalum, were are also detected at the Fansteel property. However, the elevated level of PNAs and PCBs that were detected during CEI's sediment sampling do not appear to correlate with the concentrations at the Fansteel property. Therefore, CEI concludes sources separate from Fansteel appear to have contributed to the impacts detected in Pettibone Creek (refer to Section 7.3).

7.1 Surface Soils - General

The site sampling revealed elevated concentrations of both total and SPLP lead in the surface soils. In addition, concentrations of tantalum were detected in the surface soils. Some VOC compounds, including TCE and related degradation products, were detected in surface soils. The lead and TCE concentrations are discussed in Sections 7.6 and 7.7 below. Since tantalum was not detected in the site ground water, CEI recommends establishing site-specific remediation objectives for tantalum and performing an exposure route analysis to determine if the surface tantalum concentrations pose any potential risk to human health or the environment (refer to Section 7.9). CEI notes that an engineered barrier presently exists over much of the site and can be provide an effective barrier to minimize potential ingestion and inhalation exposure risks.

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7.2 Subsurface Soils - General

As with the surface soils, elevated concentrations of both total and SPLP lead, and TCE and related degradation products were detected in the subsurface soils. The lead and TCE concentrations are discussed in Sections 7.5 and 7.6 below. In addition, concentrations of tantalum and other VOCs were detected in the subsurface soils.

During the Site Investigation, TCE or its related degradation compounds were not detected at concentrations above the site action levels in the site soils at depths below 12 ft bgs. The only VOC compound detected at a depth below 12 ft bgs was methylene chloride. Methylene chloride was detected at 14-16 ft bgs at only one sampling location (in sample GP-30I and its corresponding duplicate sample). CEI notes that, according to the laboratory report and based on conversations with Great Lakes Analytical representatives, the detection of methylene chloride at this sampling location can be attributed to residual laboratory artifacts. Therefore, CEI concludes that the extent of VOC impacts to the site soils detected during the Site Investigation do not extend below 12 ft bgs.

With respect to PNAs in the soil, the only sample intervals containing PNA concentrations elevated above the site action levels were near surface samples (0-1 ft bgs, 1-2 ft bgs and 2-4 ft bgs). During the Site Investigation, eight samples were analyzed from the 2-4 ft bgs interval and six samples were analyzed from the 4-6 ft bgs interval. Of these fourteen samples, only one sample, GP-17C from 2-4 ft bgs, contained elevated concentrations of several PNA compounds above the site action levels. CEI notes that several samples from deeper intervals ranging from 8-10 to 18-20 were also analyzed for PNAs, which were not detected at elevated concentrations. As such, CEI considers the PNA impacts to be limited primarily to the surface soils (i.e., within the top two feet).

Total lead was detected at elevated concentrations above the site action levels at depths ranging from surface to 8 ft bgs. No elevated total lead concentrations were detected at depths greater than 8 ft bgs. Leachable lead (i.e., SPLP lead) was detected at elevated concentrations to depths of 12 ft bgs. As discussed in Section 7.5, the lead impacts are unrelated to Fansteel operations and appear to be a component of the fill material which is present over much of the Fansteel property and the historic VLS property.

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Total cadmium was not detected at elevated concentrations above the site action level in any of the analyzed soil samples. Total tantalum, which does not have a risk-based action level established, was detected in several soil samples. The tantalum concentrations ranged from no detect (<5 ppm) to 325 ppm. The deepest interval in which tantalum was detected was 14-16 ft bgs. The detection of tantalum during the Site Investigation was sporadic and no distinct area of the site with prevalent tantalum concentrations was identified. For example, tantalum was detected in sample two samples from boring GP-33, one from 0-1 ft bgs (9.91 ppm) and one from 14-16 ft bgs (7.02 ppm), but tantalum was not detected in a sample from 8-10 ft bgs from the same boring.

7.3 Creek Sediment - General

The Creek sediment results collected at three locations south of 22nd Street do not indicate the presence of significant contamination to the Creek sediments. The sampling results show elevated concentrations of some PNA compounds, arsenic, total and SPLP lead, tetrachloroethene and vinyl chloride. The Creek sediment data is sporadic and do not indicate clear "trends." For example, tantalum was not detected in samples collected 300 feet and 900 feet south of 22nd Street but was detected in the samples collected 600 feet south of 22nd Street. The trichloroethene concentrations, although not detected above the remediation objectives, increase while the various PNA and PCB concentrations appear to decrease as one moves south from 22nd Street. Similarly, there is no apparent pattern in the rise and decrease in the total and SPLP lead concentrations as one proceeds south from 22nd Street.

Some of the contaminants detected at elevated levels at the Fansteel property, such as TCE and lead, were also detected in sediment samples from Pettibone Creek. Tantalum, which does not have an established risk-based action level, appears to have been detected in the Creek sediment and at the Fansteel property. However, additional compounds, such as PNAs and PCBs, were detected in the Creek sediments at elevated concentrations that do not correlate with the concentrations at the Fansteel property. There are several industrial/commercial properties operating, either historically or currently, along or in the vicinity of Pettibone Creek. CEI therefore concludes that other sources separate from Fansteel appear to have contributed or may continue to be contributing to the impacts detected in Pettibone Creek.

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7.4 Ground Water - General

Elevated concentrations of VOCs and lead were detected in the ground water and are discussed further in Sections 7.5 and 7.7. CEI notes that tantalum was not detected in the site ground water.

7.5 Lead in Soil and Ground Water

Elevated concentrations of total lead were detected in the site soils and ground water. Elevated concentrations of lead were also detected in the soil and sediment samples collected from the Vacant Lot Site and from Pettibone Creek. CEI notes that the site sampling data from this sampling event does not indicate the presence of hazardous waste concentrations of lead in the site soils. The detected lead concentrations in both the soil and the ground water are not related to Fansteel's operations.

Previous data indicates that prior to VLS, Zinc Oxide and Smelting Company and Mineral Point Zinc Company operated at the site, producing among other things, zinc oxide from the mineral sphaleride. One of the byproducts of the zinc oxide process is lead which, according to historical maps, was stored on the Vacant Lot Site and Fansteel properties. The VLS property has also been the subject of historic waste filling activities. It is believed that these operations were the source of the lead. In addition, another source of lead is believed to be North Chicago Refiners and Smelters. The sampling results from this Site Investigation indicate that the elevated lead concentrations appear to be a component of the fill material. Accordingly, the lead impacts appear to be widespread across the Fansteel property.

As described in Section 3.3, the VLS property was comprised of the three properties currently referred to as the Vacant Lot Site, Fansteel property and North Chicago Refiners and Smelters. Previous off-site sampling conducted by parties other than Fansteel (i.e., *EE/CA* investigation for Vacant Lot Site and an investigation conducted by North Chicago Refiners and Smelters on its property east of Fansteel) indicate that elevated lead concentrations are pervasive throughout the site area. CEI attributes the presence of the elevated lead concentrations to the historic usage of the property by VLS, rather than to Fansteel's operations.

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7.6 VOCs in Soil

The analytical laboratory reported TCE concentrations in samples from borings GP-13 and GP-26 at levels exceeding the soil saturation limit. These elevated or "free product" levels reported by the laboratory were estimated by the laboratory since the "recovery for this analyte in the check standard was above the method specified acceptance criteria" (please refer to footnote G14 on Great Lakes Analytical's laboratory reports). CEI notes these locations coincide with the former RCRA storage unit. As shown in Figure Five, the area in red represents the general plume delineation for soils exceeding the soil saturation limit. The plumes illustrated in black and blue represent those areas of the site with TCE concentrations in one or more analyzed samples from a given boring that exceed the ingestion/inhalation and migration to ground water exposure route objectives, respectively.

During the field investigation, CEI did not observe any indication of "free product." Specifically, no strong odors were encountered and the PID readings from borings GP-13 and G-26 were not significantly elevated. The PID readings ranged from 6.1 to 39.5 units in boring GP-13 and from 2.4 to 26.0 units in boring GP-26, whereas significantly elevated PID readings were obtained during the logging of other borings in this area (i.e., PID readings up to 1,480 units in boring GP-14).

Based on the sampling conducted to date, CEI notes that the TCE soil plumes may extend onto the Vacant Lot Site property. CEI recommends conducting additional sampling to verify the delineation of the TCE soil plumes. CEI also recommends Fansteel propose site-specific remediation objectives and conduct an *EE/CA* to further assess the contamination related to TCE and its related degradation compounds (refer to Section 7.9).

7.7 VOCs in Ground Water

Figure Six depicts two TCE ground water plumes. The TCE ground water plume located in the northern portion of the site coincides with the former RCRA HWMU. While the western boundary of this plume has not been fully delineated, it appears to be moving in a westerly direction, onto the Vacant Lot Site.

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Although TCE was detected in the Vacant Lot Site wells GMMW2 and MW-3, CEI notes that it is possible that these detections are related to a separate source area. Figure C-5 of the *EE/CA* indicates that the soils in the vicinity of sample location I2 contained elevated concentrations of tetrachloroethene at near surface levels. This sampling data is indicative of a possible additional source area related to a surface spill on the Vacant Lot Site. The compounds detected in the Vacant Lot Site ground water samples are consistent with degradation products of tetrachloroethene. CEI notes that during a site visit conducted by CEI and representatives of Fansteel, an approximately 55-gallon drum labeled as containing tetrachloroethene was observed on the Vacant Lot Site. Further investigation is recommended to determine if the TCE detected at well locations GMMW2 and MW-3 are attributable to the northern Fansteel TCE ground water plume (refer to Section 7.9).

The southern TCE ground water plume depicted in Figure Six appears to encompass Fansteel monitoring well locations MW-8 and MW-9, in addition to the Vacant Lot Site GeoProbe location GEO-6. The TCE concentration detected in the ground water sample from GEO-6 was 5 ppm and is significantly larger than the concentrations detected in the Fansteel wells (0.723 ppm in MW-8 and 0.015 ppm in MW-9). The contrast in the sample results most likely is due to the fact that the sample from GEO-6 was a "grab" sample that was not collected from a fully developed monitoring well. As such, this water sample may have contained suspended particulates which may have skewed the ground water results.

CEI notes that the southern plume does not appear to be related to the northern plume since the samples collected from monitoring wells MW-5, MW-6 and MW-7 did not contain elevated concentrations of TCE. CEI concludes the source and the extent of the southern plume have not been fully defined and therefore recommends additional investigation to further delineate the southern plume (refer to Section 7.9).

7.8 Potential Off-Site Sources

As detailed in this *Report*, CEI concludes that two TCE soil and ground water plumes are present on the Fansteel property. The northern TCE ground water plume, which is associated with the former RCRA HWMU, appears to be migrating to the west, onto the Vacant Lot Site. The southern TCE ground water plume also appears to be migrating onto the Vacant Lot Site.

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CEI concludes that other contamination detected at the Fansteel property, on the Vacant Lot Site or in Pettibone Creek may not be related to the past or current Fansteel operations. Specifically, Fansteel does not appear to be responsible for:

- Potential impacts to Pettibone Creek, including PNAs and PCBs;
- Near-surface soil impacts of VOCs on the Vacant Lot Site in the vicinity of sample location I2;
- VOC impacts detected in the ground water at Vacant Lot Site monitoring wells MW-3 and GMMW2; and
- Lead detected in the soil, ground water and Creek sediment.

CEI notes that additional sampling would be necessary to demonstrate that the VOC impacts detected in Vacant Lot Site soil samples near location I2 and in the ground water at locations MW-3 and GMMW2 do not appear to be related to the two TCE plumes detected at the Fansteel property (refer to Section 7.9).

7.9 Site-Specific Remediation Objectives and *EE/CA*

CEI recommends that Fansteel conducts a risk-based analysis to develop site-specific remediation objectives for all compounds detected during this Site Investigation at concentrations above the site action levels (refer to Section 6.1 and Tables One through Five in Attachment B). These compounds include:

- VOCs in soil - (acetone, carbon disulfide, 1,1-dichloroethene, cis-1,2-dichloroethene, trans-1,2-dichloroethene,methylene chloride, tetrachloroethene, 1,1,1-trichloroethane, 1,1,2-trichloroethene, TCE and vinyl chloride);
- VOCs in ground water - (cis-1,2-dichloroethene, TCE and vinyl chloride);

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- PNAs in soil - (benzo (a) anthracene, benzo (a) pyrene, benzo (b) fluoranthene, benzo (k) fluoranthene, dibenzo (a,h) anthracene and indeno (1,2,3-cd)pyrene);
- Metals in soil - (lead); and
- Metals in ground water - (lead).

Additionally, since a risk-based action level has not been established for tantalum, and tantalum was detected in the Fansteel property soils, CEI recommends that Fansteel conducts a risk-based analysis to develop an appropriate remediation objective for tantalum. CEI notes that performing the risk assessment for the site should include discussions with the EPA ecological and human health risk assessors assigned to review the data for the Fansteel property.

In conjunction with conducting the risk assessment, CEI recommends Fansteel conduct an *EE/CA* for the Fansteel property, including any soil and/or ground water plumes moving off-site. The *EE/CA* should evaluate the above-listed compounds that were detected at concentrations above the action levels during this Site Investigation. CEI notes that while the lead concentrations detected at both the Fansteel property and Vacant Lot Site appear to be attributed to the historic operation of these properties by VLS rather than Fansteel site operations, the *EE/CA* for the Fansteel property should still include an evaluation of the lead impacts.

As discussed in Section 7.3, the presence of elevated PNA and PCB concentrations, which are inconsistent with the contaminant concentrations detected at the Fansteel property, indicates the likelihood that other sources are contributing to the Creek sediment contamination. Additionally, while TCE and lead are present at the Fansteel facility, the identity and degree of other additional potential source areas impacting Pettibone Creek have not been performed. The presence of several other industrial/commercial facilities operating along or in the vicinity of Pettibone Creek, both historically and currently, lead CEI to conclude that it is inappropriate for Fansteel to prepare an *EE/CA* for Pettibone Creek, especially since the *EE/CA* would include an evaluation of contaminants that are unrelated to the contaminants of concern at the Fansteel property.

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7.10 Conclusions

CEI concludes that the activities conducted during the Site Investigation achieved the goals established in the EPA-approved *SIWP*. Specifically, the investigation identified potential contamination on the Fansteel property which may be impacting the Vacant Lot Site, and included additional sampling of Pettibone Creek at locations south of 22nd Street.

The Site Investigation identified two TCE plumes which appear to be migrating onto the Vacant Lot Site. In addition, the Site Investigation results identified elevated concentrations of other VOC compounds, PNAs and lead at concentrations above the site action levels. Tantalum, which does not have an established risk-based action level, was also detected in the Fansteel property soil. CEI recommends that an *EE/CA* be conducted for the Fansteel property to delineate contaminant plumes (as necessary), conduct a risk assessment to further develop site-specific remediation objectives for the site, and evaluate alternatives for conducting any needed removal action. While the lead impacts detected during the Site Investigation do not appear to be related to Fansteel operations, CEI advises that the *EE/CA* also include an evaluation of the lead impacts.

With respect to Pettibone Creek, CEI concludes that the sediment contamination detected in the Creek may be attributed to other sources. CEI therefore concludes that it is inappropriate for Fansteel to conduct an *EE/CA* for Pettibone Creek, especially since the *EE/CA* would include an evaluation of contaminants that are unrelated to the contaminants of concern at the Fansteel property.

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CARLSON ENVIRONMENTAL, INC.

ATTACHMENT A
Figures

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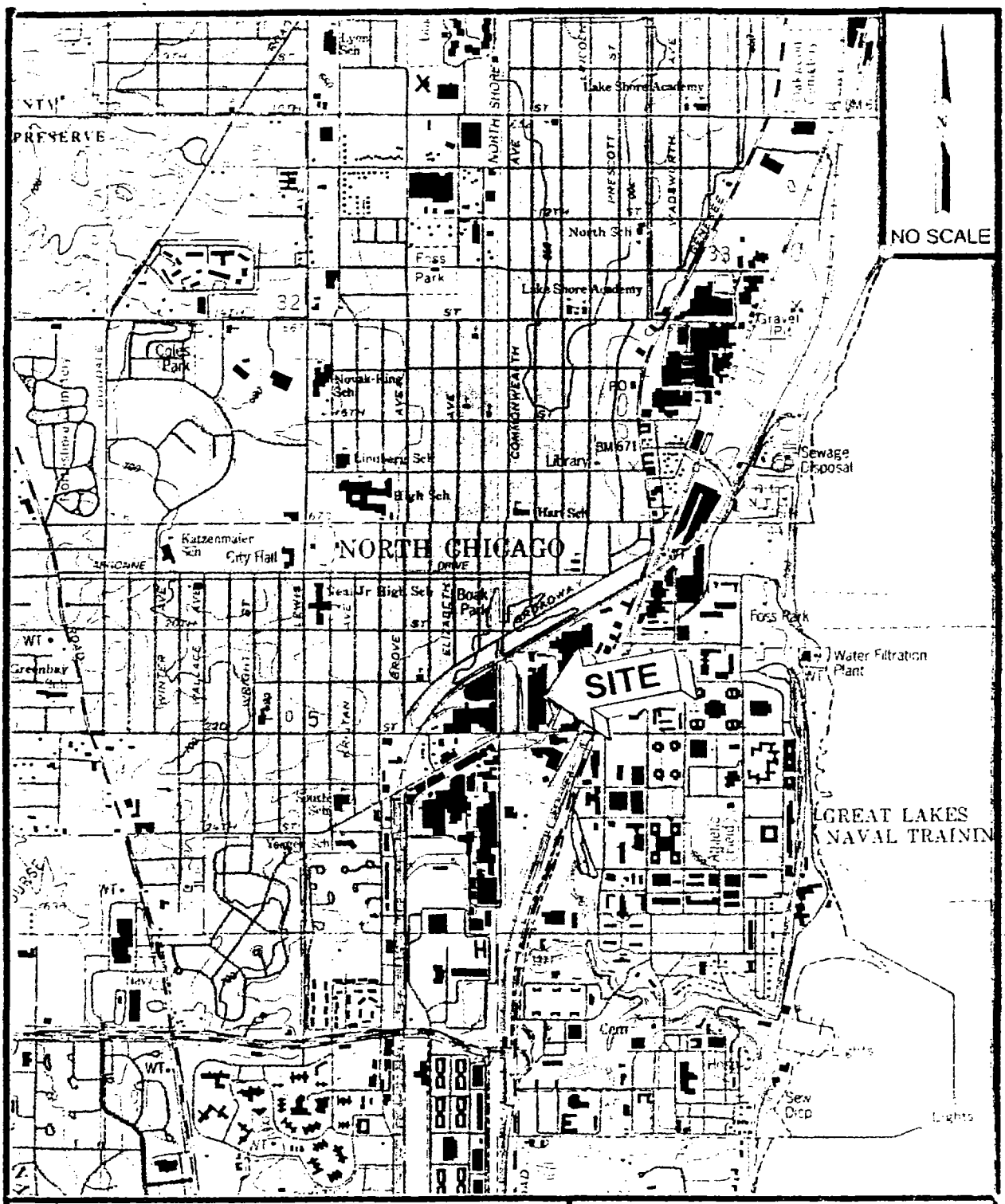
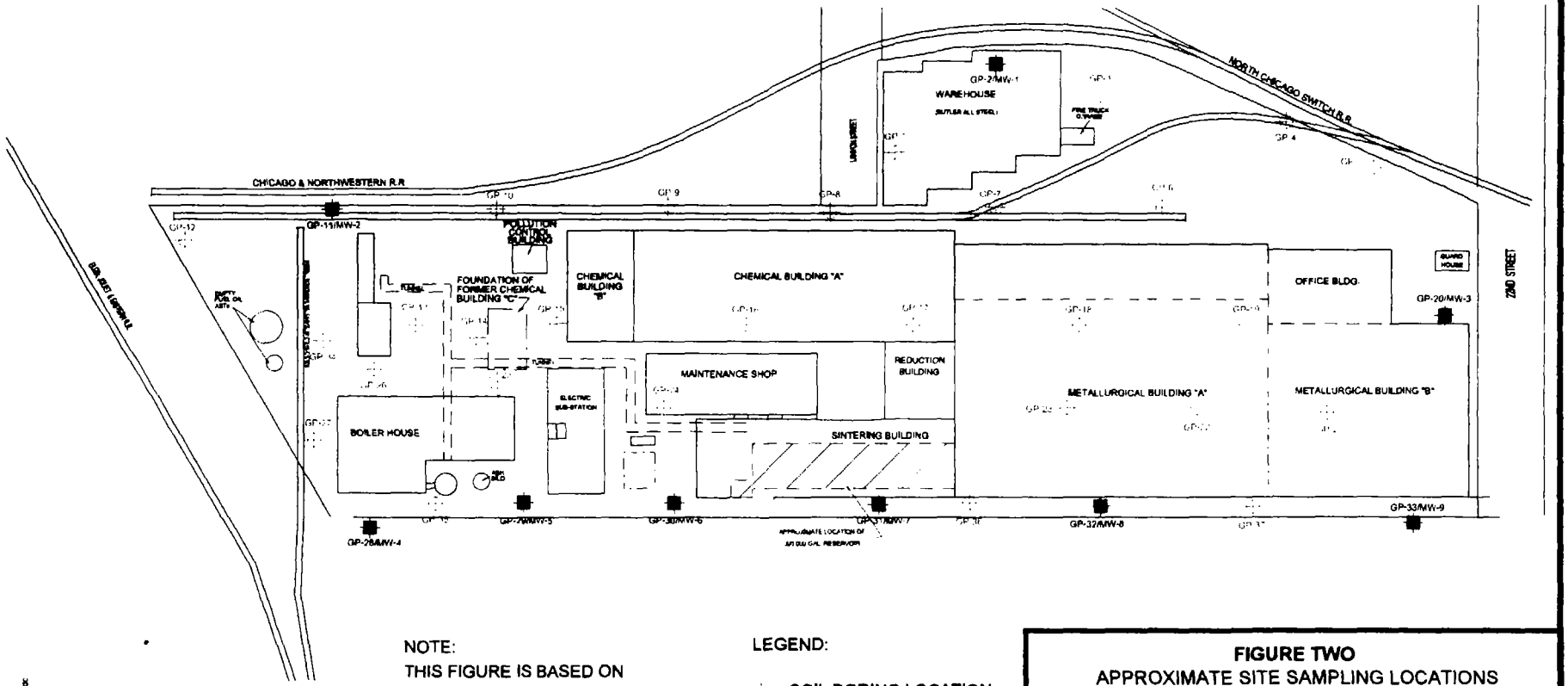


CARLSON ENVIRONMENTAL, INC.
65 EAST WACKER PLACE
CHICAGO, ILLINOIS 60601
(312) 346-2140

FIGURE ONE
SITE LOCATION

Developed from U.S.G.S. 7.5 Minute
Topographic Quadrangle Map referenced in Text



NOTE:
THIS FIGURE IS BASED ON A DRAWING PREPARED BY FACTORY INSURANCE ASSOCIATION AND DATED 2/9/60.

LEGEND:

- SOIL BORING LOCATION
- MONITORING WELL LOCATION

SCALE:

0 50 100 200'

FIGURE TWO
APPROXIMATE SITE SAMPLING LOCATIONS
FANSTEEL, INC.
One Tantalum Place
North Chicago, Illinois

CARLSON ENVIRONMENTAL, INC.
85 EAST WACKER PLACE
CHICAGO, ILLINOIS
(312) 346-2140

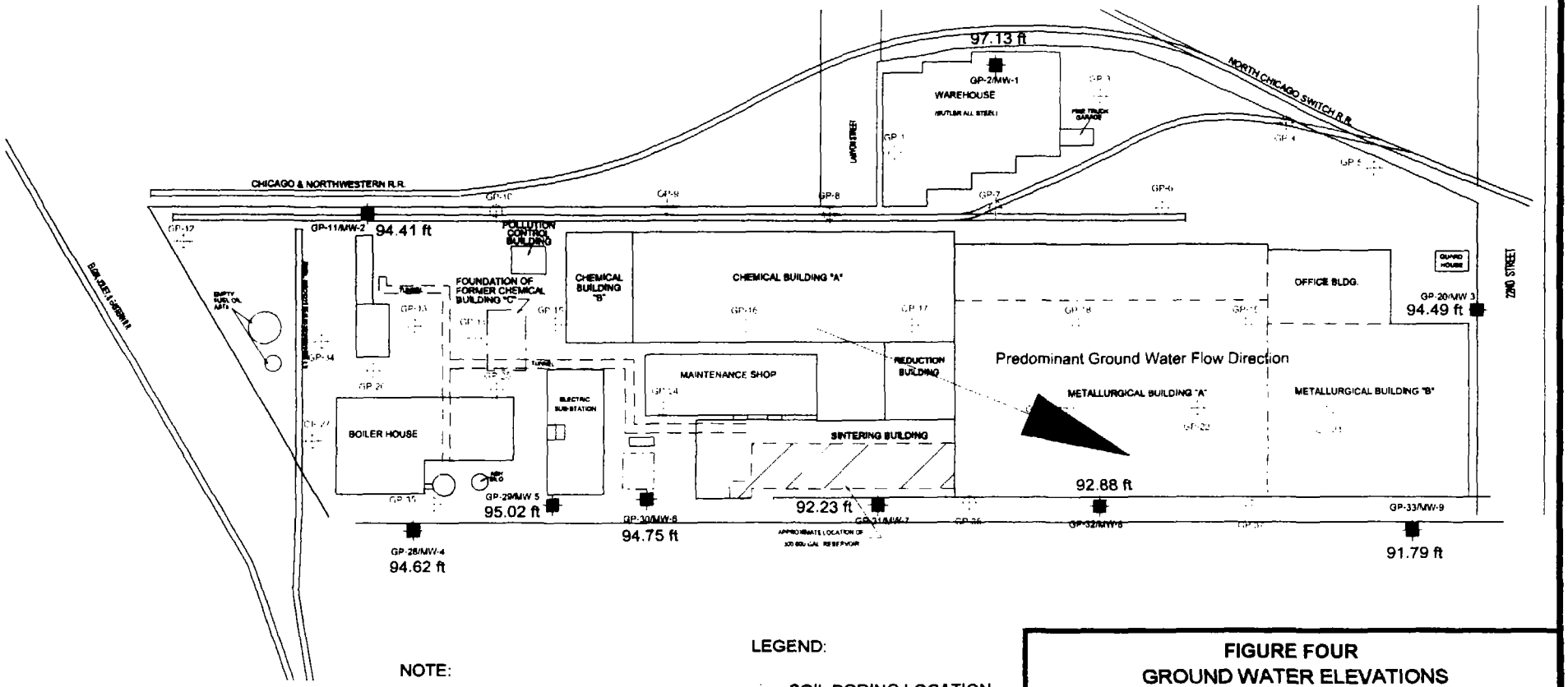
DRW	JLV
PN	9566C
DATE	11-1-00
SCALE	None

P:\9566C\SITE\CAD\FIG_TWO.dc

FIGURE THREE
APPROXIMATE CREEK SAMPLING LOCATIONS
FANSTEEL, INC.
One Tantalum Place
North Chicago, Illinois

CARLSON ENVIRONMENTAL, INC.
65 EAST WACKER PLACE
CHICAGO, ILLINOIS
(312) 346-2140

Drawn By: GV	
PN: 9566C	
Date: 6/7/00	
Scale: None	



NOTE:
THIS FIGURE IS BASED ON A DRAWING PREPARED BY FACTORY INSURANCE ASSOCIATION AND DATED 2/9/60.

LEGEND:

— SOIL BORING LOCATION

■ MONITORING WELL LOCATION

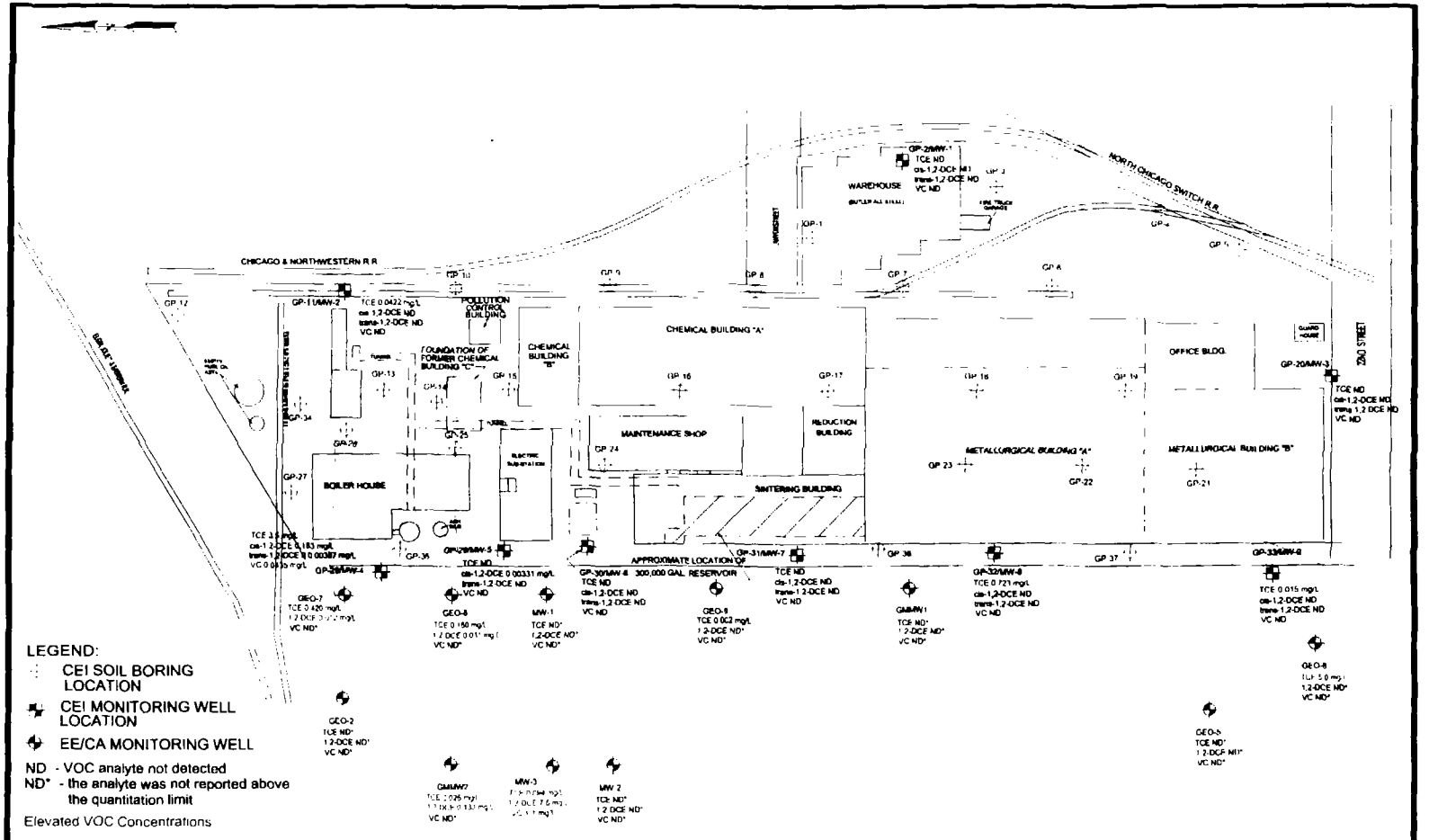
SCALE:

0 50 100 200'

FIGURE FOUR
GROUND WATER ELEVATIONS
FANSTEEL, INC.
One Tantalum Place
North Chicago, Illinois

CARLSON ENVIRONMENTAL, INC.
65 EAST WACKER PLACE
CHICAGO, ILLINOIS
(312) 346-2140

DRW	JLV
PN:	9568C
DATE:	11-1-00
SCALE	None



LEGEND:

- CEI SOIL BORING LOCATION
- CEI MONITORING WELL LOCATION
- EE/CA MONITORING WELL

ND - VOC analyte not detected

ND* - the analyte was not reported above the quantitation limit

Elevated VOC Concentrations

SCALE:

0 50 100 200'

NOTE:

THIS FIGURE IS BASED ON A DRAWING PREPARED BY FACTORY INSURANCE ASSOCIATION AND DATED 2/9/60 AND ON FIGURE C-7 FROM THE VACANT LOT SITE EE/CA DATED 10/30/97

FIGURE SIX

ESTIMATED TCE GROUND WATER PLUME DELINEATIONS

FANSTEEL, INC.

One Tantalum Place

North Chicago, Illinois

CARLSON ENVIRONMENTAL, INC.

65 EAST WACKER PLACE

CHICAGO, ILLINOIS

(312) 346-2140

DRW JLV

PN 8888C

DATE 1-18-01

SCALE See Above

LEGEND

CEI SOIL BORING LOCATION

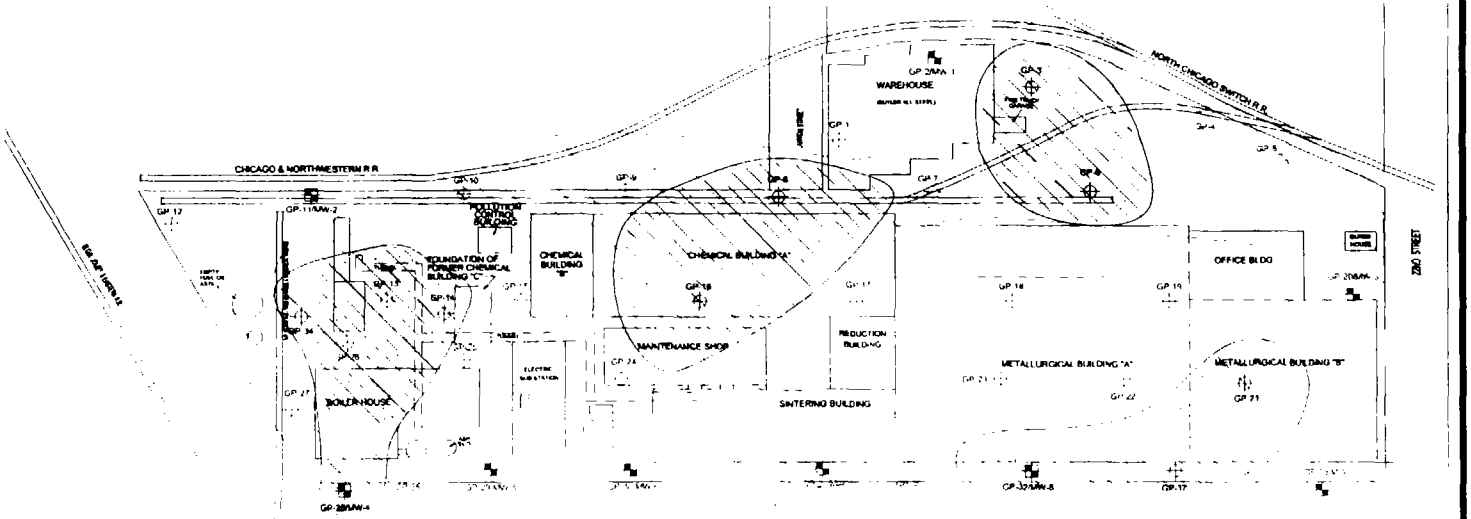
CEI MONITORING WELL LOCATION

SCALE:

0 50 100 200'

COLOR CODE:

GREEN - TCE < 0.06 ppm (MIG. TO GW)
BLUE - TCE < 8.9 ppm (INGESTION OBJ.)
BLACK - TCE > 8.9 ppm (INGESTION OBJ.)
RED - TCE > 1300 ppm (SOIL SAT. LIMIT)



NOTE:
THIS FIGURE IS BASED ON A DRAWING PREPARED BY FACTORY INSURANCE ASSOCIATION AND DATED 2/9/60.

FIGURE FIVE
ESTIMATED TCE SOIL PLUME DELINEATIONS
FANSTEEL, INC.
One Tantalum Place
North Chicago, Illinois

CARLSON ENVIRONMENTAL, INC.
85 EAST WACKER PLACE
CHICAGO, ILLINOIS
(312) 346-2160

DRW JLV
PN 0588C
DATE 1-15-01
SCALE SEE ABOVE

P:\PROJECTS\0588C\ACAD\FIG_TWO.dwg

CARLSON ENVIRONMENTAL, INC.

ATTACHMENT B
Tables

65 East Wacker Place · Suite 1500 · Chicago, Illinois 60601 · Phone (312) 346-2140 · Fax (312) 346-6956

CARLSON ENVIRONMENTAL, INC.

ATTACHMENT C
Boring Logs

65 East Wacker Place · Suite 1500 · Chicago, Illinois 60601 · Phone (312) 346-2140 · Fax (312) 346-6956

CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-1

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	04/17/00,0800	Surface Elevation	N/A
Date & Time Finished	04/17/00,0820	Driller	Enviro-Dynamics
Logged By	MMK/GV	Drill Method	GeoProbe
Depth to water	N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-1A	0-1	-	804		0			No recovery for GP-1A (0-1 ft bgs)	
	GP-1B	1-2	0	804	16			FL	Concrete with FILL	
2						2			Brown SILTY CLAY, moist, medium stiff to pliable	
	GP-1C	2-4	0	804						
4						4		CL		
	GP-1D	4-6	0	807	44					
6						6			Brown SANDY SILTY CLAY, moist to wet	
	GP-1E	6-8	0	807				CL		
8						8			Brown/gray SILTY CLAY, moist, medium stiff	
	GP-1F	8-10	0	810	44					
10						10			Gray, wet	Ground water at 10'bgs
	GP-1G	10-12	0	810						
12						12				
	GP-1H	12-14	0	812					moist, stiff	
14						14		CL		
	GP-1I	14-16	0	812						
16						16				
	GP-1J	16-18	0	815	48					
18						18				
	GP-1K	18-20	0	815						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-2

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/17/00,1100	Surface Elevation	: N/A
Date & Time Finished	: 04/17/00,1135	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-2A	0-1						No recovery for GP-2A (0-1 ft bgs) concrete	
2	GP-2B	1-2	0	1104	32		SM	Brown SAND, moist, medium grain	
4	GP-2C	2-4	0	1104			CL	Black SANDY CLAY, moist to wet	DUP-GP-2C (2-4 ft bgs)
6	GP-2D	4-6	0	1109	40				
8	GP-2E	6-8	0	1109	40		CL	Brown/gray SILTY SANDY CLAY with trace gravel, moist, stiff	
10	GP-2F	8-10	0	1116	40			Brown/gray SILTY CLAY moist to wet, stiff	
12	GP-2G	10-12	0	1116				Gray, moist, stiff	
14	GP-2H	12-14	0	1123	48		CL		
16	GP-2I	14-16	0	1123					
18	GP-2J	16-18	0	1130	44				
20	GP-2K	18-20	0	1130				EOB @ 20' bgs	
22									

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-3

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/17/00,825	Surface Elevation	: N/A
Date & Time Finished	: 04/17/00,850	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-3A	0-1	12.3	827		0		FL	Asphalt/gravel Old asphalt to 1ft	
2	GP-3B	1-2	0	827	28	2		CL	Black SILTY CLAY, stiff	
4	GP-3C	2-4	-	827		4			moist, pliable	
6	GP-3D	4-6	0	831	32	6		CL	Brown SILTY SANDY CLAY, moist, stiff, with gravel	
8	GP-3E	6-8	0	831		8				
10	GP-3F	8-10	0	835	40	10			Brown SILTY CLAY, moist, stiff	
12	GP-3G	10-12	0	835		12			Gray, semi-stiff	
14	GP-3H	12-14	0	841	40	14			stiff	
16	GP-3I	14-16	0	841		16		CL		
18	GP-3J	16-18	0	845	44	18				
20	GP-3K	18-20	0	845		20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-4

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/17/00,900	Surface Elevation	: N/A
Date & Time Finished	: 04/17/00,930	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)
0	GP-4A	0-1	0	905	
	GP-4B	1-2	0	905	34
2	GP-4C	2-4	0	905	
4	GP-4D	4-6	0	911	44
6	GP-4E	6-8	0	911	
8	GP-4F	8-10	0	916	48
10	GP-4G	10-12	0	916	
12	GP-4H	12-14	0	919	48
14	GP-4I	14-16	0	919	
16	GP-4J	16-18	0	925	48
18	GP-4K	18-20	0	925	
20					
22					

Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0		FL	Asphalt and gravel FILL	
			old asphalt	
2			Gray/brown SILTY CLAY, moist to wet, mottled, semi-stiff	
4				
6				
8				
10		CL		
12			Moist to wet	
14			Color change to gray/soft	
16				
18				
20			EOB @ 20' bgs	
22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-5

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/18/00,745	Surface Elevation	: N/A
Date & Time Finished	: 04/18/00,800	Driller	: Enviro-Dynamics
Logged By	: KOB/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-5A	0-1	3.4	745	12	0			Asphalt/gravel	
2	GP-5B	1-2	2.3	745	12	2			Gray/brown SILTY CLAY, moist, soft to medium stiff	
4	GP-5C	2-4	2.7	745	23	4		CL		
6	GP-5D	4-6	3.0	749	20	6				
8	GP-5E	6-8	1.6	749	23	8			soft	
10	GP-5F	8-10	2.1	752	21	10			Brown CLAYEY SILT, moist to wet, soft to medium stiff with some gravel	
12	GP-5G	10-12	2.2	752	22	12		ML	with coarse gravel	
14	GP-5H	12-14	2.4	756	23	14			Gray SILTY CLAY, moist, medium stiff to stiff	
16	GP-5I	14-16	1.9	756	24	16				
18	GP-5J	16-18	1.7	800	24	18		CL		
20	GP-5K	18-20	1.9	800	21	20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-6

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	04/18/00,150	Surface Elevation	N/A
Date & Time Finished	04/18/00,225	Driller	Enviro-Dynamics
Logged By	MMK/GV	Drill Method	GeoProbe
Depth to water	N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	TIme	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-6A	0-1	0	155		0		FL	Asphalt and gravel FILL	
	GP-6B	1-2	0	155	30			SM	SAND with gravel, dry, coarse	
2						2			SANDY, GRAVELLY FILL, stiff	
	GP-6C	2-4	0	155				FL		
4						4			Brown SILTY CLAY, moist, stiff	
	GP-6D	4-6	0	158	48					
6						6				
	GP-6E	6-8	2.0	158						
8						8				
	GP-6F	8-10	0	205	48					
10						10				
	GP-6G	10-12	0	205					Color change to gray	
12						12		CL		
	GP-6H	12-14	0	212	48					
14						14				
	GP-6I	14-16	0	212						
16						16				
	GP-6J	16-18	0	220	48					
18						18				
	GP-6K	18-20	0	220						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-7

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/18/00,1000	Surface Elevation	: N/A
Date & Time Finished	: 04/18/00,1040	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-7A	0-1	0	1004		0		FL	Grass covered gravel FILL	
2	GP-7B	1-2	0	1004	14	2		CL	Brown/gray SILTY CLAY, moist, semi-stiff	
4	GP-7C	2-4	0	1004		4				
6	GP-7D	4-6	0.7	1015	20	6		CL	Brown/gray SANDY SILTY CLAY, moist to wet	
8	GP-7E	6-8	0	1015		8		CL	Gray SILTY CLAY, moist, stiff	
10	GP-7F	8-10	0	1022	16	10				
12	GP-7G	10-12	0	1022		12				reddish tint at 13' bgs
14	GP-7H	12-14	0	1033	24	14				
16	GP-7I	14-16	0	1033		16				
18	GP-7J	16-18	0	1038	24	18				
20	GP-7K	18-20	0	1038		20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-8

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/18/00,815	Surface Elevation	: N/A
Date & Time Finished	: 04/18/00,900	Driller	: Enviro-Dynamics
Logged By	: KOB/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)
0	GP-8A	0-1	2.0	830	7
	GP-8B	1-2	6.2	830	9
2					
	GP-8C	2-4	11.6	830	23
4					
	GP-8D	4-6	4.3	835	22
6					
	GP-8E	6-8	2.3	835	
8					
	GP-8F	8-10	4.0	840	23
10					
	GP-8G	10-12	4.4	840	21
12					
	GP-8H	12-14	4.1	844	21
14					
	GP-8I	14-16	3.1	844	22
16					
	GP-8J	16-18	2.3	851	21
18					
	GP-8K	18-20	1.3	851	24
20					
22					

Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0			Gravel/organics	
		CL	Brown/gray SILTY SANDY CLAY, wet, soft	
2				
		CL	Brown SANDY CLAY with gravel, poorly sorted, wet to saturated, soft	
4				
		CL	Brown SILTY SAND, saturated, soft	
6				
			Gray SILTY CLAY, moist, medium stiff, very elastic	
8				
10				
12			stiff	
		CL		
14			very stiff	
16				
18				
20			EOB @ 20' bgs	
22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-9

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	04/18/00,945	Surface Elevation	N/A
Date & Time Finished	04/18/00,1030	Driller	Enviro-Dynamics
Logged By	KOB/GV	Drill Method	GeoProbe
Depth to water	N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-9A	0-1	0.8	945	6	0		FL	Gravel/rocks FILL	
	GP-9B	1-2	6.1	945	8					
2						2		ML	Gray/brown CLAYEY SANDY SILT, moist to wet, soft	
	GP-9C	2-4	6.4	945	20					
4						4		ML	Brown SILT, wet, medium stiff	
	GP-9D	4-6	2.8	950	18					
6						6		ML	Gray/brown CLAYEY SILT, wet, soft	
	GP-9E	6-8	5.8	950	21					
8						8				
	GP-9F	8-10	5.3	955	12					
10						10				
	GP-9G	10-12	4.5	955						
12						12				
	GP-9H	12-14	3.5	1000	19					
14						14			Gray SILTY CLAY, wet, medium stiff	
	GP-9I	14-16	4.4	1000	20					
16						16		CL	moist, stiff	
	GP-9J	16-18	4.1	1004	19					
18						18				
	GP-9K	18-20	4.2	1004						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-10

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/18/00,1035	Surface Elevation	: N/A
Date & Time Finished	: 04/18/00,1058	Driller	: Enviro-Dynamics
Logged By	: KOB/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-10A	0-1	4.2	1035	6		FL	Gravel/rocks FILL/organics	
2	GP-10B	1-2	4.7	1035	8		GP	Poorly sorted GRAVEL, saturated	
4	GP-10C	2-4	3.4	1035	10		CL	Brown/gray GRAVELLY SILTY CLAY, wet, soft	
6	GP-10D	4-6	2.2	1040	14		ML	Brown/gray CLAYEY SILT, wet, medium stiff	
8	GP-10E	6-8	2.7	1040	16		CL	Gray/brown SILTY CLAY, moist, medium stiff Gray	
10	GP-10F	8-10	2.9	1045	20				
12	GP-10G	10-12	2.8	1045	19			stiff	
14	GP-10H	12-14	1.5	1052	24				
16	GP-10I	14-16	3.1	1052	21			Gray CLAY, moist, stiff	
18	GP-10J	16-18	4.4	1058	20		CL		
20	GP-10K	18-20	1.5	1058	21				
22								EOB @ 20' bgs	

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-11/MW-2

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/18/00,1135	Surface Elevation	N/A
Date & Time Finished	: 04/18/00,1205	Driller	: Enviro-Dynamics
Logged By	: KOB/GV	Drill Method	GeoProbe
Depth to water	: N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-11A	0-1						No recovery for GP-11A (0-1 ft bgs)	
2	GP-11B	1-2	27.9	1135	8		FL	FILL with loose gravel/rocks, saturated	
4	GP-11C	2-4	50.3	1135	15		SP	Black SAND with some gravel, saturated, poorly sorted, oily	
6	GP-11D	4-6	11.8	1142	23		CL	Brown SILTY GRAVELLY CLAY, saturated, soft	
8	GP-11E	6-8	19.6	1142	18		CL	Brown SILTY CLAY, wet, soft	
10	GP-11F	8-10	101.0	1155	19		ML	Brown CLAYEY SILT, wet, medium sitff	
12	GP-11G	10-12	13.1	1155	21			Gray, moist	
14	GP-11H	12-14	10.4	1200	20				
16	GP-11I	14-16	11.1	1200	21				
18	GP-11J	16-18	7.6	1205	23		CL	Gray SILTY CLAY, medium stiff to stiff	
20	GP-11K	18-20	0	1205				EOB @ 20' bgs	
22									

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-12

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/19/00,745	Surface Elevation	: N/A
Date & Time Finished	: 04/19/00,815	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-12A	0-1	2.1	752		0			Asphalt/FILL	
	GP-12B	1-2	2.9	752	32			FL		
2	GP-12C	2-4	2.7	752		2				
4	GP-12D	4-6	3.5	758	26	4			Brown/black mottled SILTY CLAY, moist, soft	
6	GP-12E	6-8	2.5	758		6			with sand, medium grain, stiff	
8	GP-12F	8-10	1.2	803	45	8			Brown/gray SILTY CLAY, stiff, moist	
10	GP-12G	10-12	2.7	803		10				
12	GP-12H	12-14	3.4	806	46	12		ML		
14	GP-12I	14-16	3.6	806		14				
16	GP-12J	16-18	1.4	810	48	16				
18	GP-12K	18-20	2.4	810		18				
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-13

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00,125	Surface Elevation	N/A
Date & Time Finished	. 04/20/00,145	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	. N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)
0	GP-13A	0-1	6.1	128	
	GP-13B	1-2	-	128	28
2	GP-13C	2-4	14.7	128	
4	GP-13D	4-6	14.1	132	48
6	GP-13E	6-8	15.4	132	
8	GP-13F	8-10	39.5	136	36
10	GP-13G	10-12	26.0	136	
12	GP-13H	12-14	7.5	138	42
14	GP-13I	14-16	6.9	138	
16	GP-13J	16-18	7 1	141	48
18	GP-13K	18-20	12.1	141	
20					
22					

Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0		FL	Asphalt Sand and gravel FILL	
2		SC	Black SANDY CLAY to CLAYEY SAND, wet at 4.2 to 4.5ft	
4		CL	Gray SANDY SILTY CLAY with trace coarse sand	
6		CL	Brown/gray SILTY CLAY with occasional gravel, moist, stiff	
8				
10			with sand at 10.5 to 11ft	
12				
14				
16				
18				
20			EOB @ 20' bgs	
22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
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LOG OF SOIL BORING GP-14

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00,1250	Surface Elevation	: N/A
Date & Time Finished	: 04/20/00,120	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-14A	0-1	315	1255		0		FL	Asphalt Sand, gravel, and clay FILL	
	GP-14B	1-2	381	1255	14			SC	Black SANDY CLAY to CLAYEY SAND, moist, medium stiff	
2						2			No Recovery for GP-14C (2-4 ft bgs)	
	GP-14C	2-4								
4						4				
	GP-14D	4-6	692	1258	30				Brown/gray SILTY CLAY, moist, medium stiff to stiff, with occasional gravel	
6						6				
	GP-14E	6-8	1,442	1258						
8						8				
	GP-14F	8-10	1,480	105	38					
10						10				
	GP-14G	10-12	1,023	105						
12						12		ML		
	GP-14H	12-14	315	109	41					
14						14				
	GP-14I	14-16	397	109						
16						16				
	GP-14J	16-18	291	115	48					
18						18				
	GP-14K	18-20	91	115						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-15

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00.840	Surface Elevation	: N/A
Date & Time Finished	: 04/20/00.900	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-15A	0-1	6.9	842			FL	Asphalt, sand and gravel FILL, dry	
							SC	Black/brown CLAYEY SAND	
	GP-15B	1-2	6.1	842	32			Black SAND with fines, moist, medium grain	
2							SW		
	GP-15C	2-4	126	842					
4								Black SANDY SILTY CLAY, moist, medium stiff	
	GP-15D	4-6	21	845	40		CL		
6								Gray SILTY CLAY with trace coarse sand, moist, soft	
	GP-15E	6-8	118	845					
8								medium stiff	
	GP-15F	8-10	129	849	40			stiff	
10									
	GP-15G	10-12	224	849					
12									
	GP-15H	12-14	6.4	853	48		CL		
14									
	GP-15I	14-16	4.7	853					
16									
	GP-15J	16-18	7.8	855	48				
18									
	GP-15K	18-20	2.3	855					
20								EOB @ 20' bgs	
22									

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-16

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/19/00,1015	Surface Elevation	: N/A
Date & Time Finished	04/19/00,1100	Driller	Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	GeoProbe
Depth to water	: N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0								6in concrete	
	GP-16A	0-1	-	1025			FL	Brown SANDY GRAVELLY SILTY CLAY FILL	
	GP-16B	1-2	27.3	1025	38				
2							CL	Brown SILTY CLAY, moist, stiff, mottled	
	GP-16C	2-4	19.8	1025			SC	Black CLAYEY SAND, moist, medium grain, loose	
4									
	GP-16D	4-6						No recovery for GP-16D (4-6 ft bgs)	
6									
	GP-16E	6-8	14.1	1028	14			Brown/gray MOTTLED SILTY CLAY, moist, stiff grading to soft	
8							CL	Brown SILTY CLAY with trace sand, moist to wet, soft	
	GP-16F	8-10	14.0	1031	40				
10									
	GP-16G	10-12	36.6	1031			CL	3" SANDY CLAY seam, moist to wet	
12								Brown SILTY CLAY, moist, soft	
	GP-16H	12-14	16.2	1035	40		CL	Brown/gray SILTY CLAY, with trace coarse sand and gravel, wet	
14									
	GP-16I	14-16	18.0	1035				stiff	
16									
	GP-16J	16-18						No recovery for GP-16J (16-18 ft bgs)	
18									
	GP-16K	18-20	10.8	1040	16		CL		
20								EOB @ 20' bgs	
22									

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-17

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/19/00,1115	Surface Elevation	: N/A
Date & Time Finished	: 04/19/00,1150	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-17A	0-1	-	1118		0		FL	6" concrete Sandy, gravel FILL	
2	GP-17B	1-2	12.1	1118	38	2		CL	Black SILTY CLAY with trace coarse sand and small "crystal-like" particles, moist, stiff, wood and grass pieces observed	
4	GP-17C	2-4	14.8	1118		4				
6	GP-17D	4-6	8.4	1120	40	6			Brown/gray mottled with occasional trace coarse sand	
8	GP-17E	6-8	13.0	1120		8				
10	GP-17F	8-10	8.6	1126	40	10				
12	GP-17G	10-12	8.5	1126		12			with trace gravel	
14	GP-17H	12-14	9.9	1130	40	14		CL	Brown/gray SILTY SANDY CLAY with trace gravel	
16	GP-17I	14-16	12.5	1130		16		CL	Brown/gray SILTY CLAY, moist, stiff, with occasional trace coarse sand and gravel	
18	GP-17J	16-18	4.6	1145	40	18				
20	GP-17K	18-20	9.2	1145		20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-18

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/19/00,1155	Surface Elevation	: N/A
Date & Time Finished	: 04/19/00,1215	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0						0		FL	6" concrete Sand and gravel FILL, wood chips	
	GP-18A	0-1	-	1158						
	GP-18B	1-2	9.8	1158	36	2		SC	Black CLAYEY SAND, moist, "crystals observed"	
2										
	GP-18C	2-4	6.5	1158						
4						4		CL	Black SANDY SILTY CLAY, moist, medium stiff	
	GP-18D	4-6	7.2	1203	42			CL	Brown/gray mottled SILTY CLAY, moist, stiff	
6						6				
	GP-18E	6-8	9.0	1203				CL	Brown SANDY CLAY, moist, soft	
8						8		CL	Brown SILTY CLAY, moist, hard, with occasional trace gravel and trace coarse sand	
	GP-18F	8-10	5.0	1205	48					
10						10				
	GP-18G	10-12	7.7	1205						
12						12				
	GP-18H	12-14	6.3	1208	48					
14						14				
	GP-18I	14-16	6.6	1208						
16						16				
	GP-18J	16-18	6.0	1210	48					
18						18				
	GP-18K	18-20	5.4	1210						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-19

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/19/00,245	Surface Elevation	: N/A
Date & Time Finished	: 04/19/00,310	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-19A	0-1	-	248			FL	6" concrete, sand and gravel FILL	
2	GP-19B	1-2	11.6	248	32			Black SILTY CLAY with some black sand and trace gravel, moist, soft	
4	GP-19C	2-4	12.5	248				Brown/gray mottled, medium stiff	
6	GP-19D	4-6	16.2	253	34				
8	GP-19E	6-8	14.2	253				3" moist, soft seam becomes hard	
10	GP-19F	8-10	9.0	254	48			Brown SILTY CLAY with occasional trace gravel, soft 8-10ft, becomes stiff at 10ft	
12	GP-19G	10-12	11.4	254			CL		
14	GP-19H	12-14	12.8	302	48			6" wet, soft	
16	GP-19I	14-16	12.2	302					
18	GP-19J	16-18	13.5	306	48				
20	GP-19K	18-20	10.3	306				EOB @ 20' bgs	
22									

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-20/MW-3

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/17/00,230	Surface Elevation	: N/A
Date & Time Finished	: 04/17/00,320	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-20A	0-1	0	233		0			Grass/topsoil	
2	GP-20B	1-2	-	233	18	2			Brown SILTY CLAY with trace gravel, moist, stiff	
4	GP-20C	2-4	-	233		4		CL	Brown/gray SILTY CLAY, mottled, moist, stiff	
6	GP-20D	4-6	0	241	20	6				
8	GP-20E	6-8	0	241		8		CL	Brown SANDY SILTY CLAY seam, moist	
10	GP-20F	8-10	0	252	24	10			Brown SILTY CLAY, moist, stiff	
12	GP-20G	10-12	0	252		12				DUP-GP-20G (10-12 ft bgs)
14	GP-20H	12-14	0	300	22	14		CL	Color change to Gray	
16	GP-20I	14-16	0	300		16				
18	GP-20J	16-18	0	318	24	18				
20	GP-20K	18-20	0	318		20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-21

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00,740	Surface Elevation	: N/A
Date & Time Finished	: 04/20/00,815	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-21A	0-1	-	745			FL	6" concrete sand and gravel FILL	
	GP-21B		1.1	745	30		CL	Black SANDY SILTY CLAY, mottled	
2								3" sand and gravel, moist	
	GP-21C	2-4	2.7	745				Brown/gray MOTTLED SILTY CLAY, moist, medium stiff	
4								3" sand and gravel, moist	
	GP-21D	4-6	4.7	748	40		CL		
6									
	GP-21E	6-8	8.4	748				Sand and gravel seam, moist	
8								Brown SILTY CLAY, moist, medium stiff	
	GP-21F	8-10	13.4	755	46				
10								Brown/gray SILTY CLAY, stiff	
	GP-21G	10-12	1.7	755					
12							CL	Reddish brown SILTY CLAY with trace coarse sand	
	GP-21H	12-14	1.1	803	45				
14								Brown/gray SILTY CLAY, medium stiff to soft	
	GP-21I	14-16	1.9	803					
16								with gravel, soft	
	GP-21J	16-18	0.7	810	16				
18								No recovery for GP-21K (18-20 ft bgs)	
	GP-21K	18-20							Rock in Spoon
20								EOB @ 20' bgs	
22									

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-22

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/19/00,215	Surface Elevation	: N/A
Date & Time Finished	: 04/19/00,240	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-22A	0-1	-	218			FL	Concrete Sand and gravel FILL	
2	GP-22B	1-2	19.5	218	36			Brown/gray MOTTLED SILTY CLAY with trace gravel, moist, stiff	
4	GP-22C	2-4	11.6	218			CL	Brown	
6	GP-22D	4-6	11.3	220	30				
8	GP-22E	6-8	13.6	220				Brown SILTY CLAY, moist, stiff with trace gravel to 20ft	
10	GP-22F	8-10	14.9	223	42			becomes hard	
12	GP-22G	10-12	18.9	223				becomes stiff	
14	GP-22H	12-14	-	227	48		CL		
16	GP-22I	14-16	13.5	227					
18	GP-22J	16-18	12.4	235	48				
20	GP-22K	18-20	17.0	235				EOB @ 20' bgs	
22									

CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-23

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/19/00,135	Surface Elevation	: N/A
Date & Time Finished	: 04/19/00,210	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-23A	0-1	-	143			FL	6" concrete	
	GP-23B	1-2	18.4	143	40			sand and gravel FILL	
2	GP-23C	2-4	48.3	143			CL	Brown/gray MOTTLED SILTY CLAY with trace coarse sand, moist, stiff	
4	GP-23D	4-6	10.0	149	26			Black	
6	GP-23E	6-8	6.5	149			CL	Brown SILTY CLAY with coarse sand, moist, soft	
8	GP-23F	8-10	20.1	154	48		CL	Brown/gray MOTTLED SILTY CLAY, moist, stiff	
10	GP-23G	10-12	8.0	154			CL	Brown/gray SILTY CLAY with occasional trace gravel, moist, hard	
12	GP-23H	12-14	11.6	158	48				
14	GP-23I	14-16	35.5	158					
16	GP-23J	16-18	13.6	200	48			1 foot, moist to wet, soft	
18	GP-23K	18-20	19.8	200					DUP-GP-23J (16-18 ft bgs)
20								EOB @ 20' bgs	
22									

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-24

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00,910	Surface Elevation	N/A
Date & Time Finished	: 04/20/00,940	Driller	Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	GeoProbe
Depth to water	: N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0						0				
	GP-24A	0-1	2.3	912				CL	grass Brown SANDY SILTY CLAY, wet with trace gravel	
	GP-24B	1-2	1.3	912	22			SC	Black CLAYEY SAND, moist to wet, soft	
2						2				
	GP-24C	2-4							No Recovery GP-24C (2-4 feet bgs)	
4						4				
	GP-24D	4-6	2.8	915	32			ML	Brown SANDY SILT, wet	
6						6				
	GP-24E	6-8	2.6	915					Brown/gray SILTY CLAY, moist, medium stiff	
8						8				
	GP-24F	8-10	2.4	920	36					
10						10				
	GP-24G	10-12	2.1	920						
12						12				
	GP-24H	12-14	2.4	929	42			CL		
14						14				
	GP-24I	14-16	2.3	929						
16						16				
	GP-24J	16-18	2.7	932	29					
18						18			becomes stiff with trace gravel	
	GP-24K	18-20	2.3	932						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-25

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00,945	Surface Elevation	: N/A
Date & Time Finished	: 04/20/00,1015	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-25A	0-1	3.2	950		0		FL	Asphalt Sand and gravel FILL, dry, loose	
2	GP-25B	1-2	9.4	950	38	2		SC	Black CLAYEY SAND, moist	
4	GP-25C	2-4	27.7	950		4		CL	Black SILTY CLAY, moist, stiff	
6	GP-25D	4-6	50.0	953	42	6		CL	Gray/brown MOTTLED SILTY CLAY, moist, stiff	
8	GP-25E	6-8	21.2	953		8			4" gravel and black/brown sand layer	
10	GP-25F	8-10	42.6	959	46	10		ML	Gray/brown CLAYEY SILT, moist, medium stiff	
12	GP-25G	10-12	9.3	959		12		CL	Brown/gray SILTY CLAY with trace coarse sand, moist, stiff	
14	GP-25H	12-14	6.5	1006	48	14			stiff to hard at 14'	
16	GP-25I	14-16	7.1	1006		16			occassional gravel	
18	GP-25J	16-18	7.0	1010	48	18				
20	GP-25K	18-20	5 0	1010		20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-26

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00,150	Surface Elevation	: N/A
Date & Time Finished	: 04/20/00,215	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0						0				
	GP-26A	0-1	20.8	153	6			FL	Concrete Sand and gravel FILL	
	GP-26B	1-2	26.0	153	12			CL	Black SANDY CLAY, moist, medium stiff	
2						2				
	GP-26C	2-4							No Recovery for GP-26C (2-4 ft bgs)	
4						4				
	GP-26D	4-6	11.7	157	28				Black SILTY CLAY, moist to wet, soft Brown/gray	
6						6			Brown with sand and gravel, moist, medium stiff	
	GP-26E	6-8	11.1	157						
8						8			Brown/gray	
	GP-26F	8-10	7.3	201	36					
10						10				
	GP-26G	10-12	10.4	201					with sand and gravel	
12						12		CL		
	GP-26H	12-14	12.1	206	36				wet at 13'	
14						14			Gray, stiff	
	GP-26I	14-16	15.8	206						
16						16				
	GP-26J	16-18	2.4	210	36					
18						18				
	GP-26K	18-20	9.2	210						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-27

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00,225	Surface Elevation	: N/A
Date & Time Finished	: 04/20/00,300	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-27A	0-1	5.3	227				Grass, top soil	
2	GP-27B	1-2	7.3	227	38		CL	Black SANDY SILTY CLAY, moist, medium stiff	
4	GP-27C	2-4	2.5	227			CL	Brown/gray MOTTLED CLAY, moist, stiff	
6	GP-27D	4-6	3.4	232	36		SM	Black SAND, wet, medium grain	
8	GP-27E	6-8	8.1	232			CL	Black/brown SANDY SILTY CLAY, wet, soft Black, moist, medium stiff	
10	GP-27F	8-10	5.4	238	30				
12	GP-27G	10-12	6.1	238			CL	Brown/gray SILTY CLAY, moist, stiff	
14	GP-27H	12-14	9.9	249	42			6" fine gray sand, wet	
16	GP-27I	14-16	4.4	249				becomes a gray SILTY CLAY, medium stiff, moist	
18	GP-27J	16-18	9.7	255	48				
20	GP-27K	18-20	6.9	255				EOB @ 20' bgs	
22									

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-28

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 05/25/00 1135	Surface Elevation	N/A
Date & Time Finished	: 05/25/00 1215	Driller	: EnviroDynamics
Logged By	: SPA	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Graphic Log	USCS Log	Materials Description	Remarks
0	GP- 28A	0-1	0.6	1135	10		FL	Dark brown FILL, silty topsoil with organics	
2	GP- 28B	1-2	0.2	1135	10		CL	Dark brown, CLAY with fine sand and little silt, moist to wet	
4	GP- 28C	2-4	0.3	1135	20			Brown/ Dark brown/ gray SILTY CLAY	
6	GP- 28D	4-6	1.1	1145	21				
8	GP- 28E	6-8	0.9	1145	21		SP	Brown SAND, wet, poorly sorted, with fines	
10	GP- 28F	8-10	62.2	1155	22		CL	Gray SILTY CLAY	
12	GP- 28G	10-12	51.4	1155	22		ML	Gray, CLAYEY SILT, wet	
14	GP- 28H	12-14	1.3	1205	24		SP	Gray SAND, fine, gray	
16	GP- 28I	14-16	0.5	1205	24		ML	Gray CLAYEY SILT	
18	GP- 28J	16-18	1.6	1215	24		SP	Gray SAND, wet, fine	
20	GP- 28K	18-20	0.2	1215	24		CL	Brown/gray SILTY CLAY, moist	
22							ML	Gray CLAYEY SILT, wet	
								End of Boring at 20' bgs	

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-29/ MW5

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/18/00,240	Surface Elevation	: N/A
Date & Time Finished	: 04/18/00,305	Driller	: Enviro-Dynamics
Logged By	: KOB/GV	Drill Method	GeoProbe
Depth to water	: N/A	Sample Method	48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-29A	0-1	4.4	245	6	0		FL	Asphalt and gravel FILL	
	GP-29B	1-2	2.0	245	10					
2						2		SM	Black SAND, moist, slag, coarse, loose	
	GP-29C	2-4	3.3	245	23			ML	Black CLAYEY SILT, wet, soft	
4						4		CL	Gray/green SILTY CLAY, moist, soft	
	GP-29D	4-6	4.1	250	10				Gray with gravel, poorly sorted, wet	
6						6				
	GP-29E	6-8	3.9	250	22				Gray/brown, moist, medium stiff	
8						8		ML	Gray SILT, wet, medium stiff	
	GP-29F	8-10	4.3	256	15					
10						10				
	GP-29G	10-12	2.7	256	19					
12						12			soft	
	GP-29H	12-14	3.9	300	19				Gray/red, moist	
14						14				
	GP-29I	14-16	2.1	300	24					
16						16		ML	Gray (a bit of red) SANDY CLAYEY SILT, saturated	
	GP-29J	16-18	3.3	302	23			CL	Gray SILTY CLAY, moist, medium stiff	
18						18				
	GP-29K	18-20	4.5	302	24				stiff	
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Soil Boring GP-30/ MW-6

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/18/00,355	Surface Elevation	N/A
Date & Time Finished	: 04/18/00,430	Driller	: Enviro-Dynamics
Logged By	: KOB/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-30A	0-1	-	400	0	0		FL	Asphalt/fine gravel	
	GP-30B	1-2	4.6	400	6			SM	Black coarse SAND (slag), moist, loose	
2						2			Black/gray CLAYEY SILT, moist, medium stiff	
	GP-30C	2-4	6.0	400	12					
4						4				
	GP-30D	4-6	5.4	408	15			ML	Brown	
6						6				
	GP-30E	6-8	6.1	408	22					
8						8			(reddish color)	
	GP-30F	8-10	45.0	415	20				Gray SILT, wet, soft	
10						10				
	GP-30G	10-12	12.1	415	21			ML	with coarse gravel saturated	
12						12				
	GP-30H	12-14	16.2	420	23				Gray SILTY CLAY, moist, medium stiff	
14						14				
	GP-30I	14-16	14.1	420	23					
16						16		CL	stiff	
	GP-30J	16-18	5.5	424	23					
18						18				
	GP-30K	18-20	4.3	424	23					
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-31

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/19/00,825	Surface Elevation	: N/A
Date & Time Finished	: 04/19/00,855	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0						0				
	GP-31A	0-1	-	827					1ft concrete	
	GP-31B	1-2	3.0	827	32			FL	Sandy gravel FILL	
2						2			Black/brown SILTY CLAY, moist, stiff	
	GP-31C	2-4	3.1	827						
4						4				
	GP-31D	4-6	2.3	833	48					
6						6				
	GP-31E	6-8	2.9	833						
8						8			Gray/brown	
	GP-31F	8-10	6.3	840	48					
10						10			Rust colored with occasional gravel, mottling 10-11ft	
	GP-31G	10-12	2.1	840				CL		
12						12				
	GP-31H	12-14	4.1	848	48					
14						14			Brown/gray, medium stiff	
	GP-31I	14-16	6.0	848						
16						16				
	GP-31J	16-18	3.9	853	48					
18						18			Moist to wet	
	GP-31K	18-20	0.9	853						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-32

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 04/20/00,1030	Surface Elevation	: N/A
Date & Time Finished	: 04/20/00,1105	Driller	: Enviro-Dynamics
Logged By	: MMK/GV	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-32A	0-1	-	1036		0		FL	2" aspahlt, 4" concrete Sand and gravel FILL	
2	GP-32B	1-2	0	1036	26	2			Brown/gray MOTTLED SILTY CLAY, moist, medium stiff	
4	GP-32C	2-4	2.6	1036		4				
6	GP-32D	4-6	3.2	1039	40	6		CL	with occasional gravel	
8	GP-32E	6-8	5.3	1039		8				
10	GP-32F	8-10	3.3	1046	45	10		CL	5" SANDY/GRAVELLY CLAY, moist	
12	GP-32G	10-12	1.2	1046		12			Brown/gray SILTY CLAY, moist, stiff	
14	GP-32H	12-14	1.5	1053	48	14				
16	GP-32I	14-16	5.6	1053		16		CL		
18	GP-32J	16-18	4.5	1101	48	18				
20	GP-32K	18-20	4.5	1101		20				DUP-GP-32K (18-20 ft bgs)
22						22			EOB @ 20' bgs	

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-33

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 05/25/00,1505	Surface Elevation	: N/A
Date & Time Finished	: 05/25/00,1545	Driller	: Enviro-Dynamics
Logged By	: SPA	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-33A	0-1	1.4	1515	9	0				
	GP-33B	1-2	0.1	1515	9			FL	Dark brown FILL, with silty sand, moist	
2	GP-33C	2-4	0.6	1515	18	2				
4	GP-33D	4-6	0.1	1520	20	4		CL	Brown and Gray, CLAY, with silt and sand, soft, moist	
6	GP-33E	6-8	0	1520		6				
8	GP-33F	8-10	0	1525	22	8		ML	Brown and gray CLAYEY SILT with sand, mottled, moist to wet, medium dense	
10	GP-33G	10-12	0	1525		10				
12	GP-33H	12-14	0	1530	23	12			Gray CLAY with silt, dense, moist	
14	GP-33I	14-16	0	1530		14				
16	GP-33J	16-18	0.4	1535	22	16		CL	sandy, wet	
18	GP-33K	18-20	0.1	1535		18				
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-34

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 05/25/00,1035	Surface Elevation	: N/A
Date & Time Finished	05/25/00,1120	Driller	: Enviro-Dynamics
Logged By	SPA	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0						0				
	GP-34A	0-1	2.3	1040	9				Asphalt (3") Dark bown, FILL, with loose sand	
	GP-34B	1-2	1.3	1040	10					
2						2		FL	Brown/gray FILL, with silt and clay, with dark brown sand seams	
	GP-34C	2-4	0.8	1040	20					
4						4				
	GP-34D	4-6	0.6	1050	20				Brown and gray SILTY CLAY, very stiff, mottled, trace sand and gravel	
6						6		CL		
	GP-34E	6-8	0.5	1050						
8						8				
	GP-34F	8-10	3.5	1055	24			ML	Gray CLAYEY SILT, medium dense, moist to wet	
10						10				
	GP-34G	10-12	0.3	1055					Gray SILTY CLAY, very stiff, trace sand and gravel, moist	
12						12				
	GP-34H	12-14	0.2	1100	23					
14						14				
	GP-34I	14-16	0.9	1100				CL		
16						16				
	GP-34J	16-18	0.4	1105	24					
18						18				
	GP-34K	18-20	0.3	1105						
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-35

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 05/25/00,0940	Surface Elevation	: N/A
Date & Time Finished	: 05/25/00,1030	Driller	: Enviro-Dynamics
Logged By	: MMK	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-35A	0-1	0.5	0950	4	0			Asphalt (3")	
	GP-35B	1-2							No Recovery for GP-35A (0-1ft bgs) GP-35B (1-2 ft bgs) GP-35C (2-4 ft bgs)	
2	GP-35C	2-4				2				
4	GP-35D	4-6	0.6	955	18	4		SP	Dark brown, SAND, clayey, fine, wet	
6	GP-35E	6-8	0.3	955		6				
8	GP-35F	8-10	0.2	1005	20	8		ML	Gray CLAYEY SILT, medium dense	
10	GP-35G	10-12	0.2	1005		10			moist to wet	
12	GP-35H	12-14	0.4	1010	21	12		CL	Brown/gray SILTY CLAY, medium stiff, trace sand and gravel	
14	GP-35I	14-16	0.6	1010		14			gray	
16	GP-35J	16-18	1.8	1020	22	16		ML	Gray CLAYEY SILT, medium dense, moist	
18	GP-35K	18-20	0.2	1020		18		SP	Gray SAND, wet, fine	
								ML	Gray CLAYEY SILT, medium dense, moist	
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-36

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 05/25/00,0850	Surface Elevation	N/A
Date & Time Finished	: 05/25/00,0935	Driller	Enviro-Dynamics
Logged By	: MMK	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-36A	0-1	-	855	0	0		FL	Asphalt (3") FILL with gravel and sand	
	GP-36B	1-2	-	855	8					
2	GP-36C	2-4	-	855	8	2			Brown and gray SILTY CLAY, medium stiff, mottled	
4	GP-36D	4-6	0.2	900	19	4				
6	GP-36E	6-8	0.2	900		6		CL		
8	GP-36F	8-10	0.4	910	24	8			Brownish/gray, very stiff	
10	GP-36G	10-12	18.8	910		10		SP	Brown SAND, gravelly, wet	
12	GP-36H	12-14	0.9	920	24	12			Gray CLAYEY SILT, moist	
14	GP-36I	14-16	0.5	920		14		ML		
16	GP-36J	16-18	0.9	930	24	16				
18	GP-36K	18-20	0.5	930		18		CL	Gray SILTY CLAY, medium stiff	
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

LOG OF SOIL BORING GP-37

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Date & Time Started	: 05/25/00.0805	Surface Elevation	: N/A
Date & Time Finished	: 05/25/00.0845	Driller	: Enviro-Dynamics
Logged By	: MMK	Drill Method	: GeoProbe
Depth to water	: N/A	Sample Method	: 48" CAB Sleeve

Depth in feet	Sample Number	Depth Interval	PID (units)	Time	Recov. (inches)	Depth in feet	Graphic Log	USCS Log	Materials Description	Remarks
0	GP-37A	0-1	2.8	810	9	0		FL	Asphalt (3") Gray FILL with gravel and sand	
	GP-37B	1-2	3.1	810	9					
2	GP-37C	2-4	3.3	810	18	2		CL	Brown and gray SILTY CLAY,soft, mottled, moist	
4	GP-37D	4-6	11.1	815	22	4				
6	GP-37E	6-8	6.7	815		6		SP	Brown SAND, gravelly with fines	
8	GP-37F	8-10	165	820	24	8		ML	Brown CLAYEY SILT with occasional wet, fine sand seams	
10	GP-37G	10-12	4.2	820		10		CL	Brown and gray SILTY CLAY, stiff	
12	GP-37H	12-14	0.5	825	24	12			gray/brown with trace sand and gravel	
14	GP-37I	14-16	0.2	825		14				
16	GP-37J	16-18	0.4	830	24	16			gray, stiff	
18	GP-37K	18-20	0.2	830		18			gray, very stiff	
20						20			EOB @ 20' bgs	
22						22				

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CARLSON ENVIRONMENTAL, INC.

ATTACHMENT D
Monitoring Well Construction Logs

65 East Wacker Place · Suite 1500 · Chicago, Illinois 60601 · Phone (312) 346-2140 · Fax (312) 346-6956

CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

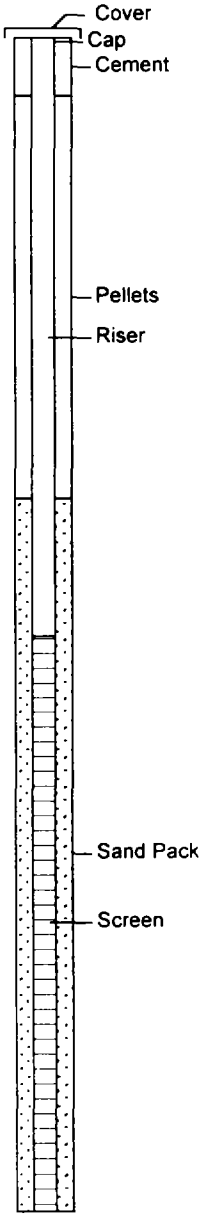
Log of Boring MW-1 (GP-2)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	: 4/17/00	Surface Elevation	100 28
Drilling Method	: Geoprobe	Casing Elevation	100.00
Drilling Contractor	: Enviro-Dynamics	Casing Stickup	No
Sampling Method	: Low Flow	Surveyed	: Yes

Depth in Feet	Well Construction Information
0	WELL CONSTRUCTION
	Date Compl 4/17/00
	Hole Diameter 3.5"
	Drilling Fluid none
2	Company Rep. --
	WELL CASING
	Material : Stainless Steel
	Diameter 2 in.
	WELL SCREEN
4	Material : Stainless Steel
	Diameter : 2 in
	Opening : 0.010 slot
	WELL MATERIALS
	Sand Pack : #5 quartz
6	Annulus Seal : Bentonite Pellets
	Grout : Bentonite Pellets
	COUNTY/STATE : Lake County, Il
8	
	Development Technique(s) and Dates
	6/13/00
10	Purge Pump on
	Static Depth to Water Date: 6/13/00
	Static Depth to Water (feet): 12.61
12	Ground Water Elevation (feet): 97 13
	Water Removed During Development (gals):
	2 25
14	Well Purpose Sampling ground water
16	
18	
20	
22	



Graphic Log	Materials Description	Depth in Feet
	No recovery, concrete/ground FILL	0
	Brown SAND, moist, medium grain	2
	Black SANDY CLAY, moist to wet	4
		6
	Brown/gray SILTY SANDY CLAY with trace gravel, moist, stiff	8
	Brown/gray SILTY CLAY moist to wet, stiff	
		10
	Gray, moist, stiff	12
		14
		16
		18
	EOB @ 20' bgs	20
		22

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

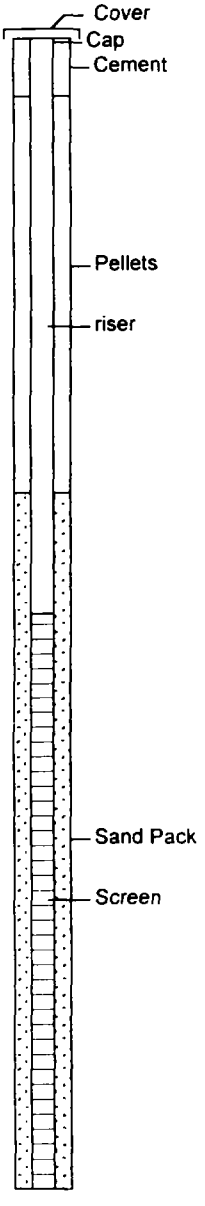
Log of Boring MW-2 (GP-11)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	: 4/18/00	Surface Elevation	96.54
Drilling Method	: Geoprobe	Casing Elevation	96.16
Drilling Contractor	: Enviro-Dynamics	Casing Stickup	: No
Sampling Method	: Low Flow	Surveyed	: Yes

Depth in Feet	Well Construction Information
0	WELL CONSTRUCTION
	Date Compl. : 4/18/00
	Hole Diameter : 3 5"
	Drilling Fluid : none
2	*Company Rep* : --
	WELL CASING
	Material : Stainless Steel
	Diameter : 2 in
	WELL SCREEN
4	Material : Stainless Steel
	Diameter : 2 in
	Opening : *0.010 slot*
	WELL MATERIALS
	Sand Pack : #5 quartz
6	Annulus Seal : Bentonite Pellets
	Grout : Bentonite Pellets
	COUNTY/STATE : Lake County, Il
8	
	Development Technique(s) and Dates: 6/13/00
10	Purge Pump on
	Static Depth to Water Date: 6/13/00
	Static Depth to Water (feet): 6 10
12	Ground Water Elevation: 94.41 ft
	Water Removed During Development (gals) 1 5
	Well Purpose: Sampling ground water
14	
16	
18	
20	
22	



Graphic Log	Materials Description	Depth in Feet
	No recovery	0
	FILL with loose gravel/rocks, saturated	2
	Black SAND with some gravel, saturated, poorly sorted, oily	4
	Brown SILTY GRAVELLY CLAY, saturated, soft	6
	Brown SILTY CLAY, wet, soft	8
	Brown CLAYEY SILT, wet, medium sitff	10
	Gray, moist	12
		14
		16
	Gray SILTY CLAY, medium stiff to stiff	18
		20
	EOB @ 20' bgs	22

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

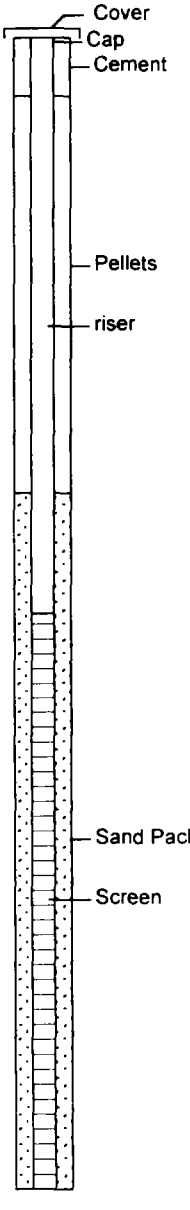
Log of Boring MW-3 (GP-20)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	: 4/18/00	Surface Elevation	: 99.71
Drilling Method	: Geoprobe	Casing Elevation	99.48
Drilling Contractor	Enviro-Dynamics	Casing Stickup	No
Sampling Method	: Low Flow	*Surveyed*	: Yes

Depth in Feet	Well Construction Information
0	WELL CONSTRUCTION
	Date Compl. : 4/18/00
	Hole Diameter : 3.5"
	Drilling Fluid : none
	Company Rep : --
2	WELL CASING
	Material : Stainless Steel
	Diameter : 2 in.
	WELL SCREEN
4	Material : Stainless Steel
	Diameter : 2 in
	Opening : 0.010 slot
	WELL MATERIALS
6	Sand Pack : #5 quartz
	Annulus Seal : Bentonite Pellets
	Grout : Bentonite Pellets
	COUNTY/STATE : Lake County, Il
8	
	Development Technique(s) and Dates: 6/13/00
10	Purge Pump on
	Static Depth to Water Date: 6/13/00
	Static Depth to Water (feet): 4.03
12	Ground Water Elevation: 94.49 ft
	Water Removed During Development (gals): 15.0
	Well Purpose
14	Sampling ground water
16	
18	
20	
22	



Graphic Log	Materials Description	Depth in Feet
	Grass/topsoil	0
	Brown SILTY CLAY with trace gravel, moist, stiff	2
	Brown/gray SILTY CLAY, mottled, moist, stiff	4
		6
	Brown SANDY SILTY CLAY seam, moist	
	Brown SILTY CLAY, moist, stiff	8
		10
		12
	Gray	14
		16
		18
		20
	EOB @ 20' bgs	22

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

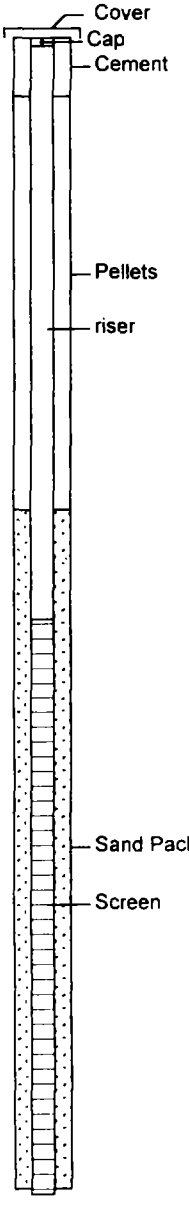
Log of Boring MW-4 (GP-28)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	: 5/25/00	Surface Elevation	: NA
Drilling Method	: Geoprobe	Casing Elevation	103.24
Drilling Contractor	Enviro-Dynamics	Casing Stickup	: Yes
Sampling Method	: Low Flow	Surveyed	Yes

Depth in Feet	Well Construction Information
0	WELL CONSTRUCTION
	Date Compl. 4/18/00
	Hole Diameter : 3.5"
	Drilling Fluid : none
2	Company Rep. : --
	WELL CASING
	Material : Stainless Steel
	Diameter : 2 in
	WELL SCREEN
4	Material Stainless Steel
	Diameter 2 in.
	Opening 0.010 slot
	WELL MATERIALS
	Sand Pack : #5 quartz
6	Annulus Seal : Bentonite Pellets
	Grout : Bentonite Pellets
	COUNTY/STATE : Lake County, Il
8	
	Development Technique(s) and Dates: 6/13/00
10	Purge Pump on
	Static Depth to Water Date: 6/13/00
	Static Depth to Water (feet): 7.68
12	Ground Water Elevation 94.62 ft
	Water Removed During Development (gals): 14.0
	Well Purpose: Sampling ground water
14	
16	
18	
20	
22	



Graphic Log	Materials Description	Depth in Feet
	Asphalt and gravel FILL	0
	old asphalt	
	Gray/brown Silty Clay, moist to wet, *mottled, semi-stiff*	2
		4
		6
		8
		10
		12
	Moist to wet	
	color change to gray/soft	14
		16
		18
		20
	EOB @ 20' bgs	22

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Boring MW-5 (GP-29)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	: 4/18/00	Surface Elevation	: 99 90
Drilling Method	: Geoprobe	Casing Elevation	: 99.51
Drilling Contractor	: Enviro-Dynamics	Casing Stickup	: No
Sampling Method	: Low Flow	Surveyed	: Yes

Well Construction Information

WELL CONSTRUCTION

Date Compl.	: 4/18/00
Hole Diameter	: 3.5"
Drilling Fluid	: none
Company Rep.	: --

WELL CASING

Material	: Stainless Steel
Diameter	: 2 in

WELL SCREEN

Material	: Stainless Steel
Diameter	: 2 in.
Opening	: 0 010 slot

WELL MATERIALS

Sand Pack	: #5 quartz
Annulus Seal	: Bentonite Pellets
Grout	: Bentonite Pellets

COUNTY/STATE : Lake County, Il

Development Technique(s) and Dates:
6/13/00
Purge Pump on

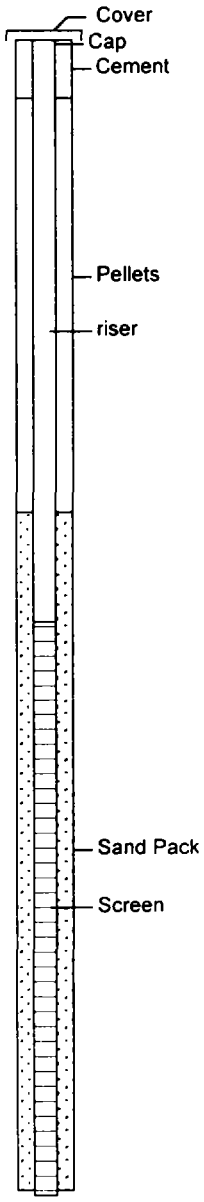
Static Depth to Water Date: 6/13/00

Static Depth to Water (feet): 3 6

Ground Water Elevation: 95 02 ft

Water Removed During Development (gals):
13.0

Well Purpose: Sampling ground water



Depth in Feet	Graphic Log	Materials Description
0		Asphalt and gravel FILL
2		Black SAND, moist, slag, course, loose
		Black CLAYEY SILT, wet, soft
4		Gray/green SILTY CLAY, moist, soft
		Gray with gravel, poorly sorted, wet
6		
		Gray/brown, moist, medium stiff
8		Gray SILT, wet, medium stiff
10		
		soft
12		Gray/red, moist
14		
16		Gray (a bit of red) SANDY CLAYEY SILT, saturated
		Gray SILTY CLAY, moist, medium stiff
18		
		stiff
20		EOB @ 20' bgs
22		

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Boring MW-6 (GP-30)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	4/18/00	Surface Elevation	100 10
Drilling Method	Geoprobe	Casing Elevation	99 81
Drilling Contractor	Enviro-Dynamics	Casing Stickup	No
Sampling Method	Low Flow	Surveyed	Yes

Well Construction Information

WELL CONSTRUCTION

Date Compl	*4/18/00*
Hole Diameter	3 5"
Drilling Fluid	none
Company Rep.	--

WELL CASING

Material	Stainless Steel
Diameter	2 in

WELL SCREEN

Material	Stainless Steel
Diameter	2 in.
Opening	0.010 slot

WELL MATERIALS

Sand Pack	#5 quartz
Annulus Seal	Bentonite Pellets
Grout	Bentonite Pellets

COUNTY/STATE : Lake County, Il

Development Technique(s) and Dates
6/13/00
Purge Pump on

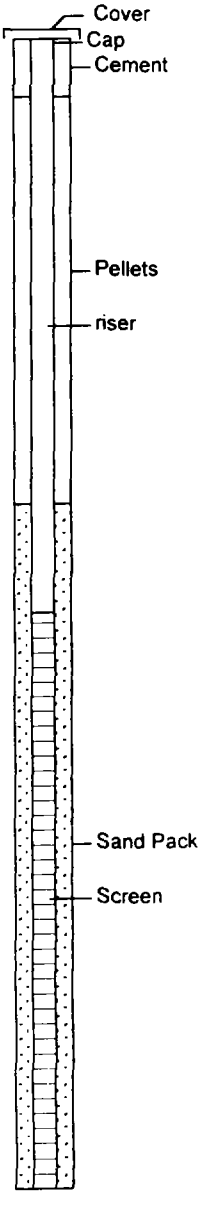
Static Depth to Water Date: 6/13/00

Static Depth to Water (feet) 4.39

Ground Water Elevation: 94 75 ft

Water Removed During Development (gals)
9.0

Well Purpose: Sampling ground water



Materials Description

Depth in Feet	Graphic Log	Materials Description
0		Asphalt/fine gravel
2		Black course SAND (slag), moist, loose
2		Black/gray CLAYEY SILT, moist, medium stiff
4		
6		Brown
8		(reddish color)
10		Gray SILT, wet, soft
10		with course gravel saturated
12		
14		Gray SILTY CLAY, moist, medium stiff
16		stiff
18		
20		EOB @ 20' bgs
22		

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

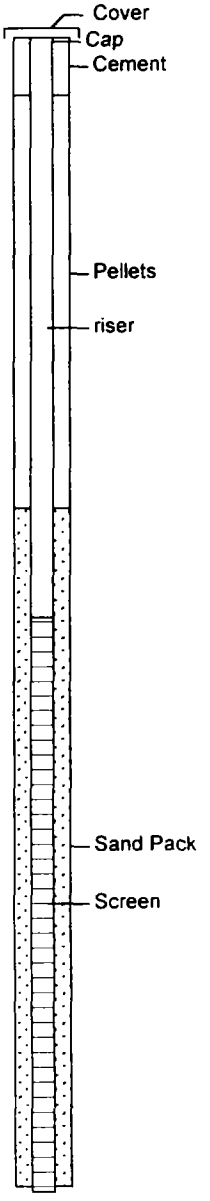
Log of Boring MW-7 (GP-31)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	4/18/00	Surface Elevation	99 46
Drilling Method	Geoprobe	Casing Elevation	99 12
Drilling Contractor	Enviro-Dynamics	Casing Stickup	No
Sampling Method	Low Flow	Surveyed	Yes

Depth in Feet	Well Construction Information
0	WELL CONSTRUCTION
	Date Compl. : 4/18/00
	Hole Diameter : 3 5"
	Drilling Fluid : none
2	Company Rep : --
	WELL CASING
	Material : Stainless Steel
	Diameter : 2 in
	WELL SCREEN
4	Material : Stainless Steel
	Diameter : 2 in.
	Opening : 0.010 slot
	WELL MATERIALS
	Sand Pack : #5 quartz
6	Annulus Seal : Bentonite Pellets
	Grout : Bentonite Pellets
	COUNTY/STATE : Lake County, Il
8	
	Development Technique(s) and Dates: 6/13/00
10	Purge Pump on
	Static Depth to Water Date: 6/13/00
	Static Depth to Water (feet): 4 07
12	Ground Water Elevation: 92.23 ft
	Water Removed During Development (gals) 3.25
	Well Purpose: Sampling ground water
14	
16	
18	
20	
22	



Graphic Log	Materials Description	Depth in Feet
	1ft concrete	0
	Sandy gravel FILL	
	Black/brown SILTY CLAY, moist, stiff	2
4		
6		
8	Gray/brown	
10	Rusted colored with occasional gravel, mottling 10-11ft	
12		
14	Brown/gray, medium stiff	
16		
18	Moist to wet	
20	EOB @ 20' bgs	
22		

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Boring MW-8 (GP-32)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	: 4/18/00	Surface Elevation	99 52
Drilling Method	: Geoprobe	Casing Elevation	99 25
Drilling Contractor	: Enviro-Dynamics	Casing Stickup	No
Sampling Method	: Low Flow	Surveyed	: Yes

Well Construction Information

WELL CONSTRUCTION

Date Compl.	4/18/00
Hole Diameter	3.5"
Drilling Fluid	none
Company Rep	--

WELL CASING

Material	Stainless Steel
Diameter	2 in

WELL SCREEN

Material	Stainless Steel
Diameter	2 in.
Opening	0.010 slot

WELL MATERIALS

Sand Pack	#5 quartz
Annulus Seal	Bentonite Pellets
Grout	Bentonite Pellets

COUNTY/STATE : Lake County, Il

Development Technique(s) and Dates
6/13/00
Purge Pump on

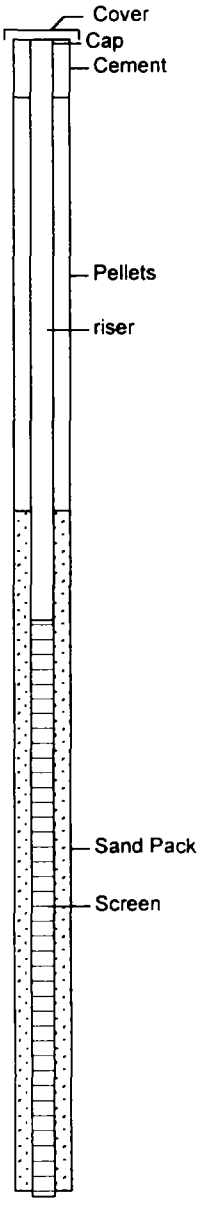
Static Depth to Water Date: 6/13/00

Static Depth to Water (feet). 6.35

Ground Water Elevation: 92.88 ft

Water Removed During Development (gals):
12 0

Well Purpose. Sampling ground water



Materials Description

Depth in Feet	Graphic Log	Materials Description
0		2" asphalt, 4" concrete
		Sand and gravel FILL
2		Brown/gray MOTTLED SILTY CLAY, moist, medium stiff
4		with occational gravel
6		
8		
10		5" SANDY/GRAVELLY CLAY, moist
		Brown/gray SILTY CLAY, moist, stiff
12		
14		
16		
18		
20		EOB @ 20' bgs
22		

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CARLSON ENVIRONMENTAL, INC.
65 East Wacker Place
Chicago, Illinois 60601
312/346-2140

Log of Boring MW-9 (GP-33)

Fansteel, Inc.
Number One Tantalum Place
North Chicago, IL

PN: 9566B

Installation Date	: 4/18/00	Surface Elevation	NA
Drilling Method	: Geoprobe	Casing Elevation	103.29
Drilling Contractor	: Enviro-Dynamics	Casing Stickup	: Yes
Sampling Method	: Low Flow	Surveyed	: Yes

Well Construction Information

WELL CONSTRUCTION

Date Compl	: 4/18/00
Hole Diameter	: 3.5"
Drilling Fluid	: none
Company Rep.	: --

WELL CASING

Material	Stainless Steel
Diameter	2 in.

WELL SCREEN

Material	: Stainless Steel
Diameter	: 2 in
Opening	0.010 slot

WELL MATERIALS

Sand Pack	#5 quartz
Annulus Seal	: Bentonite Pellets
Grout	Bentonite Pellets

COUNTY/STATE Lake County, Il

Development Technique(s) and Dates
6/13/00
Purge Pump on

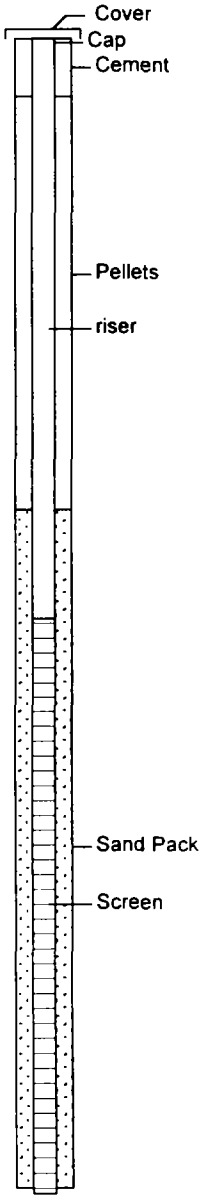
Static Depth to Water Date: 6/13/00

Static Depth to Water (feet): 11.45

Ground Water Elevation: 91.79 ft

Water Removed During Development (gals): 6.5

Well Purpose: Sampling ground water



Materials Description

Depth in Feet	Graphic Log	Materials Description
0		Dark brown FILL, with silty sand, moist
4		Brown and Gray, CLAY, with silt and sand, soft, moist
8		Brown and gray CLAYEY SILT with sand, mottled, moist to wet, medium dense
12		Gray CLAY with silt, dense, moist
16		sandy, wet
20		EOB @ 20' bgs
22		

10-18-2000 m:\mtech\borings\95\9566\9566bmw-9.bor

CARLSON ENVIRONMENTAL, INC.

ATTACHMENT E
Analytical Laboratory Reports

65 East Wacker Place · Suite 1500 · Chicago, Illinois 60601 · Phone (312) 346-2140 · Fax (312) 346-6956